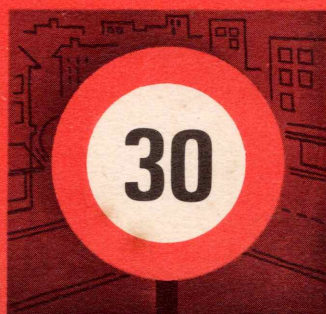
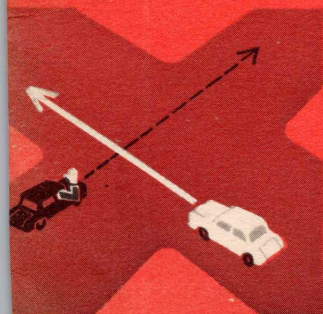
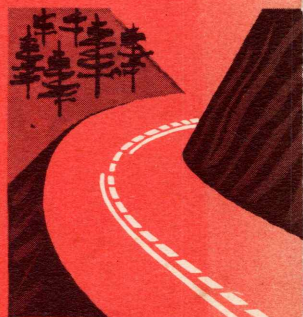
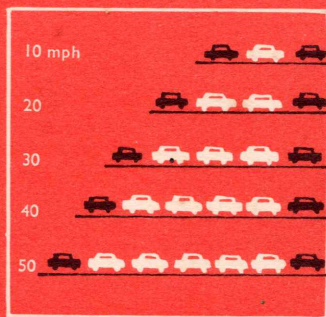


The Competent Driver

Issued by the Transport Department of New Zealand



THE
COMPETENT
DRIVER

HELPFUL INFORMATION FOR
ALL DRIVERS

*Issued in conjunction with the
Transport Department of
New Zealand*

1965
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THE
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DRIVER
REFERENCE INFORMATION FOR
ALL DRIVERS

THE COMPETENT DRIVER

Obtaining a licence

If you are under the age of 15 years you cannot obtain a licence to drive a motorcar and what is more you are not allowed by law to be taught to drive any motor vehicle on a road or street until you have reached the age of 15 years. While learning to drive you must be accompanied by a licensed driver sitting beside you.

Is the “teenager” accident prone?

There are many people who think that 15 is too young and that the age restriction should be raised to 16 or more. Many a parent possessing a car will not allow the teenage son or daughter to have the keys of the car and the reasons usually given are that young people in their teens are too rash and venturesome, too fond of speed and succumb easily to the thrill of power; are apt to take risks; in short, are prone to accidents. Are you? Have you ever had a collision when riding a cycle or even when walking. Do you “jay walk” or “jay cycle”. Do you dart out on to the road from between parked cars or ride out of gateways. Any bad habit that you may have acquired either as a pedestrian or as a cyclist will be a serious handicap to your becoming a careful motorist. Check up on your walking and cycling habits now while you are young and can learn new and better ones. The older you get the more difficult it is to make a change.

It is not the purpose of this book to encourage boys and girls to argue with their parents, but it is a fact that youth is the time to learn. Those who win renown in sports usually begin early. They may have a natural aptitude for the game in which they excel, but they also practise carefully and regularly until they acquire the correct coordination of the muscular movements involved in the game.

Even then a good player can sometimes be "off his game". A late night, a bad cold, worry, indulgence in alcohol, anything which affects his physical or mental fitness can reduce his dexterity and skill. So it is with driving a car. First learn thoroughly and secondly keep fit. Young people in their teens usually are fit, but there are two important qualifications in which heredity plays a large part; keenness of eyesight and quick reaction. There is also a third important factor – the habits acquired previous to learning to drive.

Eyesight

Some people are quick to see things out of the corner of the eye while others are restricted in this direction. Some may be so limited that they have what is termed "tunnel" vision. They can see only what is practically straight ahead of them. The range of vision, or field of vision, can be measured with a home-made cardboard protractor – radius about 12 in. (see diagram). In place of a straight diameter a shallow V is formed by extending the perimeter for 25 degrees past the diameter, on each side. At the apex of the V a small recess is cut to fit the nose – about $1\frac{1}{8}$ in. wide (A-B) and $\frac{7}{8}$ in. deep. On either side of the centre line two parallel lines are drawn – $2\frac{1}{2}$ in. apart to represent the lines of sight when each eye is looking straight ahead.

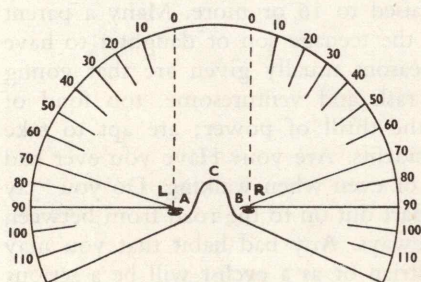


Diagram No. 1

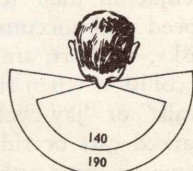


Diagram No. 2

The right and left segments are divided into degrees by drawing lines from the points R and L respectively, not from the point C where the centre line bisects the diameter. The apparatus should be placed on the bridge of the nose just below the eyes and the gaze should be fixed on a distant object straight ahead. Then, without shifting the head or the eyes, a pencil should be placed against the perimeter of the protractor at 110° on the right and be moved slowly forward until the observer becomes aware of it through the corner of his eye. The position on the perimeter is noted and a similar test is made with the left eye. The two figures added together give the

field of vision. The normal field is from 190 to 170 degrees. A field of less than 130 degrees is inadequate for safe driving. The effect of such a restricted field of vision can be obtained by placing books on either side of the face close to the eyes at an angle equivalent to 130 degrees. No one would wish to drive a car with similar blinkers over their eyes. Self-imposed tunnel vision can be caused by concentrating straight ahead and neglecting the "flanks" with the result that the driver is caught unawares by pedestrians or traffic appearing suddenly from the right or left. Motorists must be continually on their guard when passing parked vehicles, factory entrances, side roads, or inter-sections. If a person does have a restricted field of vision, this can be overcome, to some extent, by frequently glancing to the right and left.

Peripheral Vision

Peripheral vision (i.e., what can be seen out of the corners of the eyes), is only capable of detecting large objects and movement. The eyes can only see clearly over a narrow cone of vision about 10° wide straight ahead. When you are driving, it is important not to develop a fixed stare straight ahead as this makes it hard to see objects to the side. A good driver's eyes keep moving a few degrees at a time from one point to another on and near the road ahead. As he approaches a side road, entrances, parked cars or other hazards, this driver will move his whole head to see clearly any hazard from the sides.

Night vision

In the retina of the eye are two types of apparatus designed to react to the sensation of colour and of light. Colour vision is regulated by the cones, while the rods respond to light. As light decreases, all colours tend to disappear leaving a series of greys. This is the point where the cones cease to function but the rods remain on duty and rod vision operates. As the light decreases, the sensitivity to light is increased. Adaptation to the dark (e.g., in a darkroom or theatre) increases the concentration in the rods of a photochemical which on account of its purple colour is referred to as "visual purple".

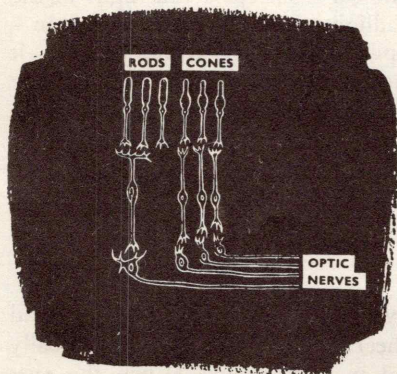


Diagram No. 3

The visual purple is essential to perception in the dark but, when exposed to bright light, it quickly bleaches. When the bright light is removed the purple is restored but only slowly. It takes some time for the visual purple to be sufficiently regained to cope with dim illumination. This is why dazzling headlights at night are so dangerous. They not only blind the driver approaching them, but, after passing, it takes some time for sufficient visual purple to be restored for him to see clearly what is ahead in the dark. It is for this reason that motorists should always observe the following rules for night driving:

1. Always dip the headlights when another car approaches, or when there is a car just ahead. Bright lights from behind can dazzle the driver in front.
2. Make sure the headlights are properly adjusted, that they do not rise above horizontal on full beam and do not deviate to the right of straight ahead. Have your garage check for height of beam and convergence, or focus.
3. Avoid looking directly at the headlights of an approaching car. Direct the gaze to the left of the road, or the cars parked there, or down at the centre line.
4. Slow down when eyesight is affected by changing light conditions. Stop when dazzled. Driving blind is senseless.
5. Don't outdrive your headlights. You must be able to stop within half the visible distance ahead. "Slow down at sundown". (Refer to "Braking Distance" on page 28 also.)

Other precautions for safe night driving are: Keep the wind-screen clean. In wet weather one of the special cleaning preparations can make a tremendous difference. Never use dark or tinted glasses after sunset. Avoid lights inside the car – except a dim light in the speedometer. Ensure that your headlights (and tail lights) are clean – dirt and dust reduces the light output substantially. Avoid fatigue – it impairs night vision. People driving late at night or during the early hours of the morning are often involved in accidents (e.g., colliding with power poles, stationary vehicles, bridges, etc., running off the road at bends). Taking into account the decreased volume of traffic the accident *rate* at night is about five times greater than during the day.

Eye fatigue

Driving for long periods causes eye fatigue, especially at night, and may result in "dozing at the wheel". Some drivers have actually fallen asleep and run off the road in consequence. When the eyes are tired the ability to judge distance is affected and the field of

vision is narrowed. When undertaking a long journey it pays to stop and give the eyes a rest. Close them and press the forefingers gently over the eyelids.

Reaction time

In car driving alertness is essential. Some people are naturally wide awake and notice things quickly while others are sluggish or absent-minded. Some develop the habit of daydreaming while walking, cycling, or driving, and when an emergency arises are too slow in their reactions to cope with the situation. Road signs are passed unnoticed; noises denoting mechanical trouble fail to attract attention; the smell of an overheated engine has no meaning. The messages transmitted to the brain through the senses are merely received. There is no interpretation, no reaction. Dust in the distance on a winding road conveys nothing. Patches of gravel, slippery surfaces, blind approaches, come into view, but before the driver wakes up to the danger it is too late. He is caught unprepared. Even when the motorist is on guard it takes time even to carry out such a simple operation as lifting the foot off the accelerator. It takes time for the message from the eye (or the ear) to reach the brain, which in turn has to send the appropriate impulse to the hand or foot to make the movement required. This cannot be done instantaneously no matter how well trained eye and hand, or eye and foot, may be to work together. There are several devices for testing reaction time. One of the simplest consists of a signal light and a knob, the latter held in the hand. When the light flashes the knob is pressed down. Even such a simple reaction as this, when the signal is expected and only one movement has to be made, cannot be carried out in a flash – it takes approximately one-fifth of a second. When the test is complex (e.g., three lights are used to indicate brake, dip, and blow on the horn and the driver has a miniature car to steer at the same time) the brain takes time to decide which movement is required before sending the impulse to the hand or foot. For most people the average reaction time in a test like this is between half a second and one second. Half of those tested took longer than three-quarters of a second. During this apparently short time, at 40 m.p.h., a car would travel 44 ft or nearly three car lengths while the driver was shifting his foot on to the brake pedal and after that the brakes would have to take effect, another 120 ft (with average brakes on a hard, dry road). Should the reaction time be longer for some reason then the car will travel so much further. Fatigue, conversation, preoccupation, alcohol, all retard reaction and the difference of a split second may mean the difference between life and death.

Work out for yourself how far a car travels in three-quarters of a second at 20, 30, 40, and 50 m.p.h. On the other hand, intelligent anticipation will ensure prompt responses when needed and the reaction time will be shortened to a minimum.

In emergency situations the driver cannot stop to think what he should do. His reaction must be swift, almost automatic. The correct foot and arm or hand movements can only become fixed through continual practice. Air pilots, for instance, must have a certain number of hours flying experience before being granted a licence to operate an aeroplane. This is done to ensure that reliable flying habits are firmly established. Skill cannot be achieved without them. The skilful driver can "double-declutch" and slip from top gear into second without having to think about it and without grating the gears. His foot shifts automatically from the accelerator to the brake pedal ready for instant action whenever he anticipates that an emergency may arise, for example, a group of children congregated on the footpath, a blind corner or a factory entrance ahead, or wandering stock grazing at the side of the road. He has acquired these habits through constant repetition, right from the time he commenced to drive. Habits cannot be established if exceptions are permitted. The beginner must take pains and not hurry over the initial movements when learning to drive nor allow himself to omit any of the precautions required. Otherwise he will not acquire that firm foundation to build on nor become a master motorist. Many of the habits essential to skilful driving are acquired long before a person starts to drive a motor car, for example:

Punctuality

One of the habits that schools endeavour to establish. Those who are habitually running late are habitually in a hurry, and in a motor-car this means speeding and taking risks. *Starting on time* is more important than arriving in time. Making up time on the highway is a frequent cause of accidents. The good driver not only starts on time but has a few minutes up his sleeve for emergency delays. The habit of punctuality is formed in the early years. Dawdlers are not generally born that way, they acquire the habit.

Sense of fair play

This is a prominent feature in schools and "fair play" is a characteristic of school games. No doubt it is the tone and tradition of the school that curbs unfair behaviour, and when this influence

is removed there is some backsliding with certain individuals. Others, on the other hand, maintain it through life. The latter will regard the traffic officer as a road referee whose duty it is to keep road users "on side" and to see fair play. They realise that behaviour that is a danger to others must be checked and they accept the necessary restrictions and regulations which have been formed to ensure a square deal to every one. Antagonism towards traffic officers and deliberate flouting of the rules of the road indicate that the sense of fair play is dead, or nearly so. Drive your own car as if your school colours were attached to it, and before long the renown of New Zealand's motorists will equal that of its sportsmen.

Modesty

This is a characteristic usually found in the true sportsmen. However clever he may be he does not try to advertise his prowess. A young child will frequently try to attract attention by showing off, but he is expected to grow out of this fondness for display as he grows older. Those who fail to do so are suffering from retarded development. Some motorists are afflicted with this childish habit. They boast of the short time they took to travel from one place to another. They try to impress their unfortunate passengers by driving fast, never letting any one pass them on the road, overtaking at risky places. Such drivers are particularly dangerous after a party where liquor has been consumed. They will stoutly declare that they drive better after one or two drinks. Not only does alcohol slow up perception and reaction time but it also tends to increase confidence and create a feeling of relaxation with the result that ordinary caution is diminished. Its effect on the exhibitionist is decidedly dangerous. It exalts his already exaggerated opinion of himself and intensifies his desire to perform wonders at the wheel. It would be far safer to walk than accept a lift in the car of such a driver. Accident statistics prove this.

Self control

This habit is essential to good driving and must be developed from early years, even in pre-school children who are easily provoked into a display of temper. This natural weakness can best be overcome through training in good manners, using encouragement rather than harsh methods which only generate a wrong attitude

towards courtesy. In the teenage, feelings are easily roused and it often requires a strong will to keep a tight rein on them. Letting oneself go will spoil one's driving capacity. Anger, irritability, impatience, overexcitement, or mental disturbance of any kind overpower and banish that cool head required to meet emergencies. Self-indulgence does not develop self-control. It engenders greed and helps to produce the motorist who takes more than his half of the road, or the one who is not content to take his place in the line of traffic but overtakes and forces his way in ahead of another car which has to fall back to give him room. He is the type of motorist usually referred to as a "road hog". He pulls out from the kerb regardless of traffic about to overtake him or makes a right-hand turn across the path of an approaching cyclist. He always suits himself regardless of the feelings or welfare of others and is nothing but a menace when driving a car. Akin to the greedy inconsiderate motorist is the "small" man who, because he is not regarded as of much importance in the world, either by his employers or his associates, finds satisfaction in asserting himself when the opportunity arises. He refuses to move over when the driver behind gives a warning toot that he wishes to overtake. He finds compensation in holding up a line of traffic by travelling at a slow speed on a winding road. This type of driver is not very common, but he does exist. Make allowances for him. Perhaps he is suffering from a surfeit of advice from a backseat driver or from an overdose of "petticoat government" at home.

Concentration

Some develop the power of concentration on the task in hand in spite of disturbances while others are handicapped with a butterfly attention that flits from one thing to another. When driving they are easily distracted by conversation from a passenger, by children playing in the rear compartment, or by something unusual in the landscape. They turn their heads and in doing so turn the steering wheel; just a fraction perhaps, but enough to make the car run off the road or collide with a power pole, or strike some inoffensive pedestrian. Some very distressing fatal accidents have been caused by drivers turning in their seats or letting their eyes wander from the road in front of them. It is inviting disaster for a passenger to tell a driver to look at something interesting that is not in the driver's line of sight, or to converse with him when road conditions and traffic demand undivided attention.

Intelligent anticipation

In addition to maintaining vigilance the driver must anticipate what other vehicles or pedestrians *might* do. If he is following a truck, and a timber yard or right-of-way comes into view, he hangs back in case the truck makes a turn into them. If he is passing a stationary bus halted to let down passengers he not only drops his speed down but his right foot is ready to jam on the brakes should a passenger dart out from in front or behind the bus, especially in wet weather when pedestrians are inclined to hurry across the road. If he sees children playing on the footpath he anticipates a possible emergency. He gives the horn a touch just to attract their attention to his approach and slows down so that, if one does dash on to the road, he can swerve or stop in time. He does the same when about to overtake a young cyclist. There have been many accidents which could have been averted had the driver exercised a little intelligent anticipation.

So much for the general habits of behaviour which play such an important part in determining the skill of the person at the wheel. There are other habits which drivers must acquire and can do so before they graduate to the motorcar.

Keeping left

This can become a habit. If cultivated when walking on the footpath or when cycling, it is not difficult to keep it up when motoring. Strange to say, it is failure to observe this simple rule that is a major cause of accidents. *Keeping left means as far over to the left as possible.* Some motorists develop the bad habit of driving in the centre of the road. On winding roads they invariably swing over on to their wrong side at bends. Remember that only half the road is yours, the other half belongs to the other fellow. Keep well away from his boundary line.

Signalling

This is another habit acquired while cycling. No movement to the right should be made until the right hand has indicated the move. If making a complete right turn, then the hand should be extended for at least five seconds before making the turn. Many drivers who invariably signal a right-hand turn at an intersection fail to signal

when pulling out from the kerb or when swinging out to overtake. Again there are others who signal their intention of slowing down when in a line of traffic and the car ahead reduces speed, but they neglect to signal when easing up prior to pulling in to the kerb. Signals must be given regularly, not intermittently, if signalling is to become a habit.

Lazy signals must be avoided at all times. The hand that hangs limply at the side of the car means nothing and, what is more, indicates an inert, indolent frame of mind. Give your signals with precision; it helps to develop the right attitude for expert driving.

Looking behind

Despite what happened to Lot's wife, looking behind is indispensable in present-day traffic. The pedestrian must do so when crossing at a "T" intersection. It is the first thing a cyclist should do before moving out to overtake or to make a right-hand turn. The motorist has a rear-vision mirror for the purpose, but even this is not sufficient at times as there are blind areas on each side of the rear window and it is necessary to look out to the rear from the driver's side window, especially before pulling out from the kerb or opening a right-hand door. Several nasty accidents have been caused by the sudden opening of the right-hand door of a stationary car or truck. Drivers pulling out to overtake a slow vehicle without looking for fast overtaking traffic have been astonished when something from behind crashes into them.

HABITS

or Routine to develop while learning to drive

Checking Over Before taking the car out of the garage, make sure the wind will not close the doors of the garage while backing out. A couple of wedges will prevent this. Glance at the tyres. It is better to discover a flat or soft tyre while the car is in the garage than when some distance down the road. A soft front tyre will affect the steering, probably in an awkward situation. Make it a habit to check each week the water in the radiator, the oil in the crank case, and the acid in the battery. If the plates are showing, top up with distilled water or rain water collected in a non-metallic basin. Check tyre pressures regularly. They last much

longer when kept at correct pressure. A certain amount of air escapes while the car is standing in the garage.

Seating Make sure the seat is at the right distance so that the ball of the right foot rests comfortably on the accelerator. The driver should not have to lean forward to reach the steering wheel. The body should rest comfortably against the back of the seat. If the seat is so low that the driver sees the road through the steering wheel instead of over the top of it, he will have to raise the seat or use a cushion. If this is necessary, there will be another adjustment to make – the rear-vision mirror.

The Rear-vision Mirror See that this is tilted at the correct angle; not too high nor too low or too much to the left or right. This mirror is important. It is a substitute for eyes at the back of the head. Remember what has been said about the importance of looking to see what is coming up behind before pulling out to overtake, or when pulling out from the kerb.

Gear-change Procedure *Before* putting in the ignition key test the gear lever to see that it is in neutral. Many drivers leave their cars in low gear rather than keep the hand brake on all night as there is a tendency for it to stick, especially in the cold weather. Before starting, therefore, whether in the garage or stationary at the side of the road, always test the gear lever and make sure it is in neutral. Absent-minded drivers who have forgotten to do this have had some unpleasant surprises. One went through the end of the garage and another rammed a truck parked just ahead of him. This is known as “learning the hard way”, but is very expensive and unnecessary. Before going into action it would be as well to make sure we know exactly where the gear lever must be placed for LOW, SECOND, and TOP gears and for the REVERSE. If the lever is one that goes straight through the floor to the gearbox it will have to be moved through a “gate” shaped like a capital letter H, neutral position being in the centre of the cross bar.

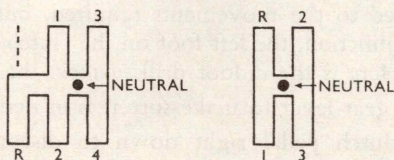


Diagram No. 4

To back out of the garage it is necessary to engage the REVERSE gear which in the case of the three-forward gear box is usually situated in the top left corner. In the four-forward gear box it is either extreme left up or down. The other gear positions are illustrated in diagram No. 4. When the gear change is placed on the steering column, usually on the left side, the gate in most cars is the same but is vertical instead of flat, as if it is tipped up on its right edge so that the left arm is uppermost and the right arm directly below it.

When the gear change is placed on the steering column, the common arrangements are as follows:

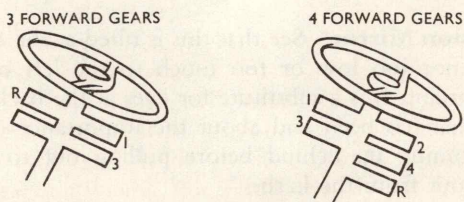


Diagram No. 5

Notice that in the case of the three forward gears LOW and REVERSE are usually in the top channel. When moving from neutral to either of these two positions keep the hand *under* the lever, palm upwards, with a slight upward pressure when moving forward or backward. SECOND and TOP gears are in the bottom section and the hand should be on *top* of the lever, palm downward with a slight downward and outward pressure as the gear is moved from LOW across and forward to SECOND gear. Keep the hand on *top* pressing downward and outward when moving from SECOND to TOP gear. Several English cars have four forward gears instead of three and with the reverse gear there are five positions for the lever. To engage REVERSE in the four-forward gear case, the knob on the lever must be pulled out. The driver must therefore become thoroughly acquainted with the gear positions on the particular car that he is going to drive. Practice in gear changing can be carried out without starting up the engine and the learner should do plenty of it because, not only must the hand become habituated to the movements required, but both feet must also work in conjunction, the left foot on the clutch and the right on the accelerator. Here is the indoor drill. *without* the engine running:

1. Waggle the gear lever to make sure it is in neutral.
2. Press the clutch pedal right down to disconnect the engine from the gearbox. This reduces the mechanism which will be moved by the battery when the starter is pressed.

3. Keeping the clutch well down move the gear handle into the REVERSE position as if preparing to back out.

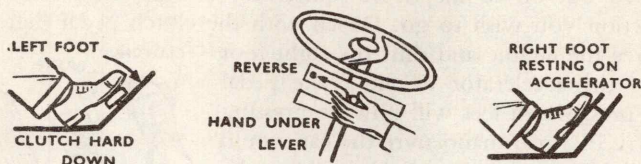


Diagram No. 6

4. Rest the right foot lightly on the accelerator. If the engine were running, this would make it turn over a little faster than what is known as idling speed. This slight increase in speed is necessary to cope with the increase in the load when the clutch pedal is gradually released and the clutch begins to engage with the flywheel of the engine. The point where contact commences will be felt when the clutch pedal has been released a short distance. Imagine that this has taken place. The problem now is to let the clutch gradually take hold and at the same time feed a little more petrol into the engine to cope with the extra work it has to do. This is done as indicated in step 5.

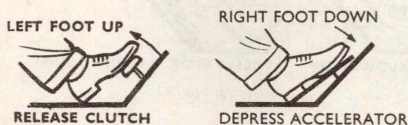


Diagram No. 7

5. Lift the left foot *slowly*, releasing the clutch and simultaneously press down with the right foot *slowly*. This slow upward movement of the left foot and downward movement of the right must be synchronised. It must *not* be hurried. When practising with the engine running avoid racing the engine before releasing the clutch, i.e., too much right foot; and, *vice versa*, avoid the quick lift of the left foot that lets the clutch in with a jerk making the car jump and probably stopping (stalling) the engine. The right amount of movement in both feet can be learned through practising in a quiet street or, better still, in a paddock where you can concentrate on your footwork and not have to bother about steering a certain course.

6. So far as this *indoor* drill is concerned the gear lever is now in reverse, the left foot off the clutch resting on the floor and the right foot pressing the accelerator a little. Imagine you have backed out on to the street sufficiently to stop and turn in the direction you wish to go. Down with the clutch pedal (left foot) to free the engine and shift the right foot from the accelerator to the brake pedal and press. Both feet will now be pressing down. In a real manoeuvre the car would be stationary and at a slight angle to the kerb with the engine still running.

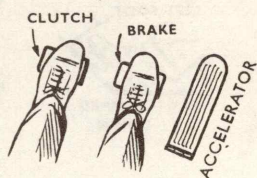


Diagram No. 8

7. Pretend you are turning the nose of the car to travel forward. Keep the clutch pedal well down and rest the right foot on the brake pedal ready in case the car begins to drift.

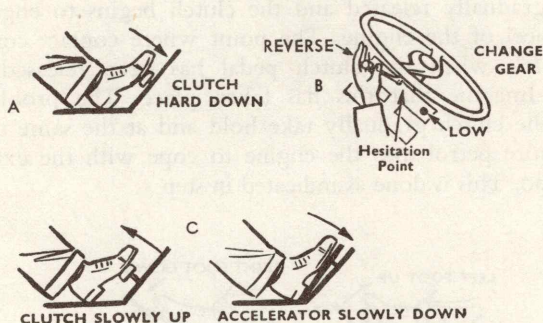


Diagram No. 9

8. Still keeping the clutch well down (A), move the gear lever from REVERSE to LOW (B), pausing or hesitating at the half-way or neutral position. Then gradually release the clutch with the left foot at the same time gently pressing the accelerator with the right as in (C) (diagram No. 9). This would set the car moving forward in LOW gear.

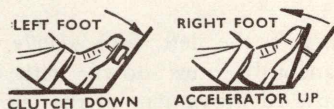


Diagram No. 10

9. Imagine your speedometer has advanced to 10 m.p.h. when you should change up to SECOND gear. Down with the left foot to de-clutch (diagram No. 10) and up with the right foot to avoid

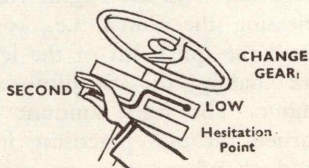


Diagram No. 11

racing the engine when the clutch is free. Now move the gear lever into SECOND. Remember to keep the palm of the hand on top and to push forward and downward, pausing at the neutral position, (diagram No. 11).

10. Gradually lift the left foot to release the clutch and press the accelerator with the right to cope with the extra load.

11. Imagine that your speed in SECOND gear has reached 15 m.p.h. when the car will have sufficient momentum forward to carry it along while changing gears and to prevent the engine from labouring along when the load imposed by TOP gear is brought to bear. Down with the left foot, up with the right, bring the lever to TOP gear position, hesitating at the half-way position as before (diagram No. 12).

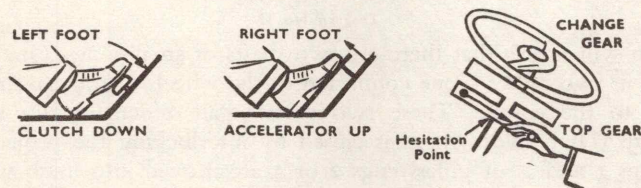


Diagram No. 12

12. Gradually release the clutch and depress the accelerator. *Remove the left foot from the clutch.* Letting it rest on the clutch pedal will cause unnecessary wear. Rest the foot on the floor.

You can carry on the indoor drill moving back from TOP to SECOND and then to LOW remembering the foot movements and the position of the palm of the hand. Then repeat the 12 movements mentioned above using your imagination to picture the behaviour of the car and looking through the windscreen all the time, not at the gear lever. You must be able to move the gears into the various positions with your eyes shut. Your hands and feet must be drilled into making the correct movements without having to think about them and without the aid of the eye to guide them. They must be synchronised. When the car is actually on the move it will be found that moving down from TOP to SECOND and LOW is not so easy as when moving up from LOW to SECOND and TOP. Beginners find it difficult to avoid grating the gears when moving down, especially from SECOND to LOW. To understand this we had better see what is inside the gearbox.

Here is an illustration of a simple type that will explain how the gears work:

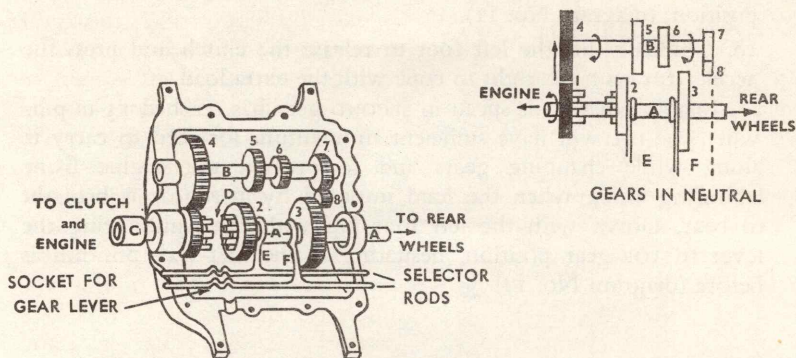


Diagram No. 13

You will notice that there are two shafts or small axles. One shaft (A) is in two pieces – one connected to the wheels of the car and the other to the engine. These two parts rotate independently unless the gap (D) between them is closed by interlocking the projections on cogs 1 and 2, or unless cogs 2 or 3 are moved into mesh with a cog on shaft B.

The small cog 1 is always in mesh with the larger cog 4 and the countershaft B with its other cog wheels will always be turning when cog 1 is spinning. If neither cogs 2 and 3 are in mesh and the gap D is not closed, the engine is said to be in neutral as no movement is transmitted to shaft A and the driving wheels. Cogs 2 and 3 (or gears as they are called) are connected to shaft A by means of projections or lugs which fit into grooves on the shaft. These cogs can therefore be made to slide to and fro on the shaft by one

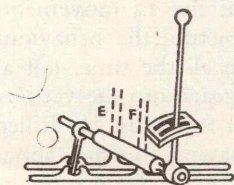


Diagram No. 14

of the two arms, E and F, these arms, (known as the selector rods), are moved by the gear lever. When the arm F slides cog 3 into mesh with cog 6 the rotation from cog 1 is conveyed through cog 4 to shaft B and thence to cog 6 on to cog 3, which in its turn revolves shaft A, and the movement is thus transmitted to the rear driving wheels. The small cog 6 is driving the large cog 3 and the car is then in LOW gear. You will now understand why the clutch pedal must be pushed well down before gears are engaged. It forces the clutch and engine flywheel apart and thus prevents the engine from driving cog 1 and the cogs on shaft B, while these are being engaged with either of two cogs (2 and 3) on shaft A.

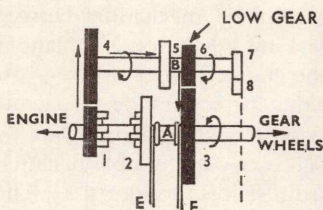


Diagram No. 15

which the arm E springs (diagram No. 13). As this rod is moved back towards the rear, the arm E takes with it cog 2 and meshes it with

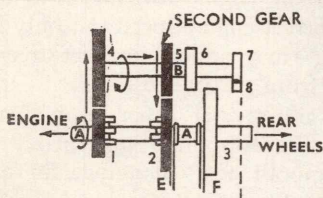


Diagram No. 16

To engage SECOND gear the clutch is again separated from the engine flywheel, and the gear lever is moved forward, removing cog 3 from 6 as it comes to neutral position. The lever is then transferred across to the socket on the other selector rod from which the arm E springs (diagram No. 13). As this rod is moved back towards the rear, the arm E takes with it cog 2 and meshes it with cog 5 (diagram No. 16) which is smaller than cog 2 but the difference in the sizes is not so great as between cogs 6 and 3 and consequently shaft A is rotated a little faster.

To engage TOP gear the engine is again disconnected from the gearbox by depressing the clutch

as before and the gear lever brought to the halfway position thus moving cog 2 out of mesh with cog 5 and sliding it towards cog 1 as in the original diagram No. 13. When the gear lever is pulled right back cog 2 is moved still further towards cog 1 until the projections or "dogs" (dogs' teeth), as they are called, lock with those on cog 1 and there is no longer the break between them (diagram No. 17). The rotary movement from the engine can now pass direct along shaft A to the rear driving wheels. Cog 1 is still turning cog 4 and the other cogs on shaft B but these are not in contact with the cogs on shaft A and so exercise no influence on the rotation of shaft A.

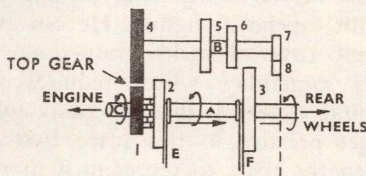


Diagram No. 17

The REVERSE gear is obtained from neutral by bringing cog 3 into mesh with cog 7 (diagram No. 18), with this difference that a third cog 8 links the two and is required to obtain the reverse rotation of cog 3. Cog 7 rotates towards shaft A and its teeth meshing with those on cog 8 cause the latter to revolve in the opposite direction towards shaft B. This cog, meshing with cog 3, turns it in the opposite direction again (i.e., the same direction as cog 7) and in this way the reverse rotation is obtained.

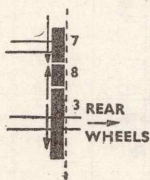


Diagram No. 18

In modern gearboxes there is a "syncromesh" mechanism between the higher gears but this is sometimes lacking when you are changing to low gear. In low gear the speed of the engine is very much greater than the speed of the rear wheels and the correct engine speed must be obtained if cog 3 is to mesh smoothly with cog 6 (diagram No. 15). To get this increase in engine speed it is necessary to "double-declutch" (i.e., declutch and bring the gear lever from SECOND to NEUTRAL). Then lift the left foot to let the clutch engage. Give the accelerator a touch to "rev" up the engine to LOW gear speed. Then down with the left foot again (declutch) and slip the gear into LOW. As in all gear shifts the driver then lifts his left foot slowly and depresses the accelerator. These movements may be practised without the engine running as in the indoor gear changing drills, but the correct engine speed can only be gauged when the car is actually moving – in a paddock or quiet street – where the driver can practise moving from SECOND to LOW.

If a paddock is available, there are several other movements which the young motorist can practise to obtain proficiency in manoeuvring a car in addition to smooth gear changing, for example, slowing down to a stop with the appropriate hand signal; keeping the engine running and moving forward again as happens in slow traffic or when waiting at a crossing controlled by a traffic officer or traffic lights. He can also erect four sticks to represent the four corners of a garage and practise entering from the left and from the right. A horizontal stick across the two back ones at the same height as the front bumper will do duty as a wall and the driver can practise inching his way forward until the bumper just touches it lightly. He can also practise backing down between two rows of sticks representing a narrow lane. Steering in reverse is something which requires practice also. A driver must be quite expert at this, especially when parking in a narrow space. To get practice in this place two sticks about one and a half car's lengths apart to represent a short parking space between two cars.

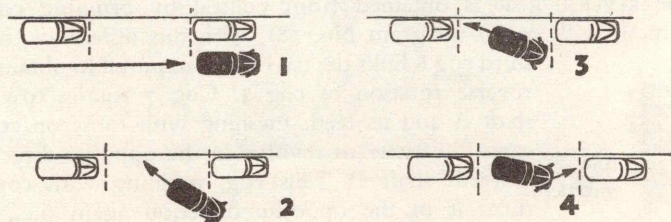


Diagram No. 19

Drive the car up parallel with what would be the front car and about 2 ft away from it. Remember to give the stop signal as you slow down. In a real situation you would look for overtaking traffic before attempting to back into the parking space. Now start to back in slowly, inch by inch, slipping the clutch to reduce the car's movement to a minimum while you turn your front wheels to the left (position 2) to direct the stern of the car towards what would be the kerb and about a yard in front of where the rear car would be. When your front door is about opposite the front stick (the rear of the front car) straighten the front wheels and continue backing until the left end of your front bumper is about opposite the stick, then turn the wheel hard over to the right (see position 3) to bring the stern round towards the imaginary rear car. This movement will bring the nose of your car over towards the kerb. Be careful not to graze the front stick. If you do it is equivalent to hooking your front bumper into the rear bumper of the front car. Keep backing till the stern of your car is nearly, but not quite, in line with the rear stick (see position 4) then turn your wheels left again (see position 4) and inch the car forward till about 2 ft behind the front stick, straightening up the front wheels as you do so. If the right hand guards of your car are then in line with the two sticks you have parked your car in an expert manner. Remember it is easier to *back* into a short parking space. If you attempt to drive forward into it you will probably cut in too close to the rear car and score your rear guard on the front bumper of the rear car. The ability to park in a narrow space is a good test of judgment and car control. Should you find that when completing the manoeuvre your car is not in line with the two sticks but protrudes into what would be the roadway (i.e., is too far from the imaginary kerb), then take the car forward into position 1 and try again. Much depends upon the angle at which you first back into the parking space.

When actually parked in the street put on the hand brake, lock all doors. If the doors can be closed and locked without having to use the key be sure to have your car keys in your hand as you shut them. It is very disconcerting to find when you *have* shut the door that your keys are still in the ignition switch. If you have a spare set of keys you will be fortunate. If not, you will have to call in at the nearest garage to get a mechanic to get your door open, and this costs money.

If you have to park on a downhill grade, turn the front wheels to the left so that they come to rest against the kerb. Put the car into REVERSE gear and pull the hand brake on firmly. If you park on an uphill slope, turn the front wheels to the right then back

slightly till the front left tyre comes against the kerb. Put the car into low gear and pull the hand brake on hard. The tyres resting at an angle against the kerb, the gears, and the hand brake should prevent the car from moving down the incline.

While practising backing into the short parking space, practise coming out again. Back very slowly, turning the wheels to the left to bring the stern towards the kerb and the nose of the car over towards the road. Be sure not to go back so far that you would bump the vehicle behind you. If you did the bumper bars might interlock and it is not easy to separate them. Your car will now be at a slight angle similar to that shown in position 4. Now move forward as slowly as possible bringing the wheels round to the right as in position 3. A considerable amount of turning of the steering wheel will be necessary to bring the wheels from their left inclination over to the right and it is not wise to do this with a stationary car; keep it moving when possible. When turning hard to the right use the left hand to bring the steering wheel round till the hand has reached "5 o'clock" and then bring the right hand over it to somewhere about "12 o'clock" on the wheel and continue pulling in this manner (i.e., right hand over left until the wheels are in correct position).

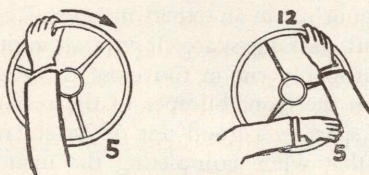


Diagram No. 20

When doing this in the street look for overtaking traffic before pulling out. When practising, be careful not to graze the front stick with the left rear guard or back bumper.

Places where you should not park

1. In towns and built-up areas keep well back from those places where vehicles cross over the footpath (e.g., entrances to garages, factories, timber yards, rights-of-way, etc.) where a car would obstruct the view not only of drivers emerging on to the roadway, but also of those approaching these exits. For a similar reason vehicles must not park within 20 ft before a pedestrian crossing. Even at that distance a parked car partially obstructs the view. Park further back, if possible, and certainly no nearer.

2. It is particularly dangerous to park just round a bend or corner where an overtaking driver will come upon the parked car suddenly and have to swerve to avoid it. Parking near the corner at intersections not only obstructs the view of approaching cross traffic, but forces overtaking drivers to swing towards the centre of the road just when they should be keeping to the left.
3. At T-intersections, where there is bound to be turning traffic, cars parked near the corner are particularly dangerous.

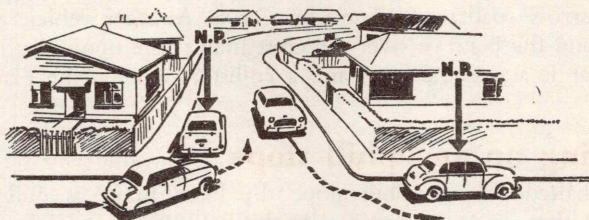


Diagram No. 21

4. You may not park a car across the entrance to a private garage, or so close to it that the stern or the nose of the vehicle projects across the entrance. In cities there are usually "Keep Clear" warnings at certain entrances and at bus stops, etc. The sportsman observes these notices and other parking signs as well. Study what the *Road Code* has to say about these signs.
5. At night park near a street light. Only when the vehicle is so illuminated as to be clearly visible at 150 ft may it be parked without any lights on.
6. In the suburbs or in the country never park at a bend or just below the crest of a hill or near the approaches to a narrow bridge. In short, park your car where it will not create a hazard or be a nuisance.

Turning round in a narrow street also requires some manoeuvring backward and forward.

Look in the rear-vision mirror for overtaking traffic then pull up close to the left, turning the wheels to the right as the car comes to a halt. (1) Look again for traffic from the rear and from the front, then back round keeping the steering wheel hard right but watch that the left front guard does not brush against a post or something as it comes round. Be careful, too, that as the stern comes round towards

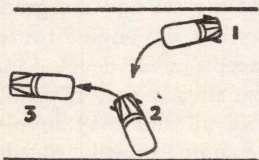


Diagram No. 22

the opposite side that the rear left guard does not do likewise. (2) Now slip into low gear and move slowly forward bringing the front wheels hard over to the left. (3) If the road is so narrow that you cannot clear the right-hand side, then back round to the right and move forward once more.

This about-turn is often prohibited in busy city streets. Even at the intersections this "U-turn", as it is generally called is sometimes prohibited and the driver must move into a side road to make his about turn *and not near the corner* where he will interfere with traffic entering the side road. In the country never attempt to turn on a narrow road near a bend or a crest. Another vehicle approaching round the bend or over the crest may come upon you just when your car is across the road and a collision would take place.

Starting on an uphill slope

When halted on an uphill slope the hand brake is pulled on to prevent the car from running backward. When starting again the hand brake is released slowly as the right foot depresses the accelerator and the left foot slowly lets the clutch pedal come back. Just as the clutch is released slowly until it begins to grip so is the hand brake held until the engine begins to pull against it before it is freed. If the brake is taken off too soon the car will drift backward and the engine will stall as the clutch engages. The same thing will happen if it is held too long. Correct timing is necessary to reduce the grip of the hand brake as the clutch takes hold. Should the engine stall, apply the foot brake immediately and declutch (i.e., the left foot goes hard down as the right comes off the accelerator on to the brake pedal). Shift into neutral gear and apply the hand brake. You can now take your right foot off the brake pedal and return it to the accelerator preparatory to starting the engine again. It is essential to practise starting on an uphill grade where there is little or no traffic, where you will not be likely to become flustered.

When parked on a downhill grade and you wish to back, the procedure is the same as when starting on the uphill grade.

When travelling on a long downhill grade it is better to change down to third or second gear (depending on the car and the grade) at the beginning of the decline and go down on the engine instead of the brakes. Should the down grade be a steep one, or develop into a steep one, low gear will be needed, and it has already been explained that this is the most difficult gear change of all and may involve double-declutching. On a downhill grade the engine must be speeded up much more in the double-declutching as the car is moving more

rapidly and before the low gear is engaged the engine has to be revved up to a speed equal to that when travelling fast in low gear. The beginner would be well advised to bring the car to a stop and engage the low gear while the car is stationary.

Cornering

Taking a corner or a sharp bend at speed is inviting disaster. The weight of the car travelling in a certain direction gives it momentum in that direction. If the front wheels are turned acutely, the back wheels tend to skid in the direction they have been travelling. In addition, the body of the car also tends in that direction and leans over. Passengers also find themselves lurching over. It is no wonder that the car overturns if the front wheels are turned when travelling at fast speed. Braking when at the corner is bad driving. Always reduce speed *before* coming to the bend or corner, then you may accelerate while actually turning if your speed is not too fast. Any acceleration should be done gently and only on the level or uphill grades. You will find that the "advisory speed signs" erected below corner signs on many main roads are an excellent guide to cornering speeds. Always adjust your speed *before* reaching the corner.

Braking

One wet day a young van driver travelling on a bitumen road was approaching an intersection controlled by traffic lights. The green light was showing and he was hurrying to get across before it changed, but the red light came on and he had to apply his brakes suddenly. His vehicle skidded on the wet road, then went out of control to the left and struck an old man standing on the footpath waiting to cross. The injuries proved fatal. This tragic accident should emphasise the danger of applying brakes on a slippery surface. Smooth, wet bitumen, or a muddy patch, frost, ice, snow, loose gravel, the wet surface of a wooden bridge, can all cause a skid, even when the brakes are not applied. When this happens *keep the foot off the brake*. It will only aggravate the skid if you do attempt to pull up the car. Violent reaction of any kind will only make things worse. When you feel the rear of the car sliding to one side or the other the first thing to do is to turn your front wheels to counteract this slide. Turn your wheels to keep the nose of the car pointing the way the car is moving.

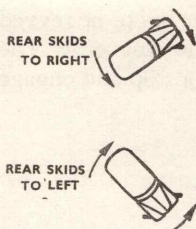


Diagram No. 23

When turning the front wheels do not wrench them round suddenly or pull them round *too far* as this can change the skid into the opposite direction. As soon as the car begins to straighten out start turning the front wheels back into line again.

Avoid lifting the foot *suddenly* off the accelerator as this brings the braking effect of the engine into play.

The best way to cope with a skid is to prevent it from happening by keeping a keen watch on the road surface and by intelligent anticipation. In frosty weather there are bound to be some shady parts on the road (e.g., round the bend that cuts off the sun, alongside a belt of trees, or over the crest of a hill when travelling in a southerly direction). In wet weather small slips often occur on the sides of roads in hilly country and these frequently spread a muddy slush across the road. The alert driver is ready for slippery spots round the bend. A bumpy bend on a dry road can cause a skid if taken too fast.

Where the edge of a narrow bitumen strip merges into the earth and grass at the side there is a potential hazard; the car may slither over off the bitumen. If it does, never try to get back until the car has slowed down and never apply the brakes. A quick wrench of the wheel or a stab on the brake will cause a skid. Slow down, then turn on to the road. If there is a shoulder in the road, as is often the case when the bitumen does not cover the full width, there may be a distinct ridge between the two, in which case, the return back on to the bitumen should be made at a fairly sharp angle, but only after speed has been decreased to slow.

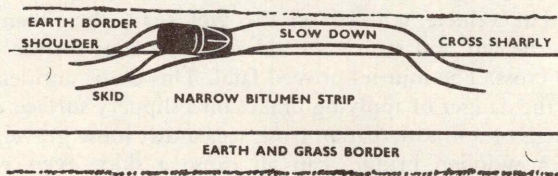


Diagram No. 24

Traction

Modern bitumen roads have a rough surface to give a better grip. This does not, however, warrant driving with tyres worn smooth. Friction between tyres and road surface is essential to the control

of the car. Even when starting, the car cannot “push off” if the tyres will not grip. Sprint runners have starting blocks to prevent their feet from slipping when they make their initial leap forward. They also have spiked shoes to give them grip of the track.

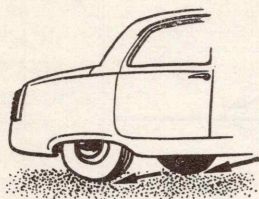


Diagram No. 25

Tyres get their purchase from the friction or grip they have on the road surface. If the surface is wet clay, fine shingle, or loose sand and there is little or no resistance to the thrust of the rear tyres, the wheels merely spin round without moving the car and gouge out a trough. Some drivers make the mistake of thinking that pressing on the

accelerator to increase the rotation of the wheels will help to get the car moving, whereas the only effect is to gouge still deeper and before they know what has happened the car is down almost to the rear axle. As soon as the wheels start spinning; stop. The remedy is to create better traction somehow – and for *both* wheels, not merely the one which has sunk deeper than the other. Scooping away the mud or sand for a yard or so in front of the rear wheels to give a short level track will sometimes be sufficient. Move the car out *slowly*, slipping the clutch to avoid too much thrust from the tyres which would only set the wheels spinning again. Should the surface be rather loose or soft it will be necessary to use branches, scrub, flat stones, or planks to make a firmer foundation. A couple of sacks kept in the boot of the car always come in handy in several ways and in circumstances like this can be used to improve the traction. Deflating the rear tyres improves the traction, but this must not be overdone if there is no hand pump in the car and the nearest free-air station a long way off. Sometimes it is possible to back out rather than try to go forward remembering to ease the friction of the wheels by moving very slowly.

When faced with crossing through a creek or shallow river get into low gear and keep the car moving slowly but steadily. If you let the car stop you will probably have to get horses to pull you out. If you go too fast the water splashed up could stop your engine.

Brakes

Brake maintenance is important and they must be sufficiently effective to bring a vehicle (including any trailer attached) to a stop within 35 ft on a normal road surface when travelling at

20 m.p.h. The hand brake must be able to stop the vehicle within 70 ft under similar conditions. It must also be able to hold a vehicle on a gradient of 1 in 5. Even so, it is advisable when

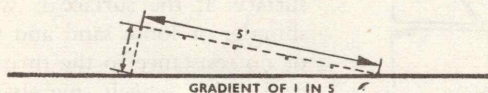


Diagram No. 26

parking on a slope to turn the wheels against the kerb and thus take the strain off the hand brake. (See page 19.) Brakes cannot be effective if the road surface is slippery or the tyres worn smooth. The degree of grip or friction between tyres and road – the “coefficient of friction” as it is called – plays an important part in the stopping distance affected by the brakes.

Coefficient of friction

As an experiment obtain a piece of tyre tread, say 5 in. by 3 in., and nail it to a block of wood the same size and about an inch thick. Place a rock or some weight on the wood. Attach a small spring scale with string for pulling. Put the tyre and rock on a road surface and pull the string parallel with the road. Note the amount of pull required to make the tyre move. If the weight of the rock and tyre is 10 lb and the pull required is 6 lb, the coefficient of friction is $\frac{6}{10}$ or 0.6. A coefficient of 0.8 is very high. The difference between the number of pounds of pull needed (a) when the road is very dry, (b) when it is wet, will illustrate the difference that may be expected in the stopping distances on these two types of surfaces. In addition to the resistance that the road surface offers to the tyres, the degree of friction between the brake lining and the brake drum is of equal importance.

Worn brake linings will not give sufficient friction against the brake drums. Oil or water on the linings also reduces the friction. Drivers should remember this when they have to drive through water. It is desirable to apply the brakes several times after crossing a ford to dry out the linings and restore friction.

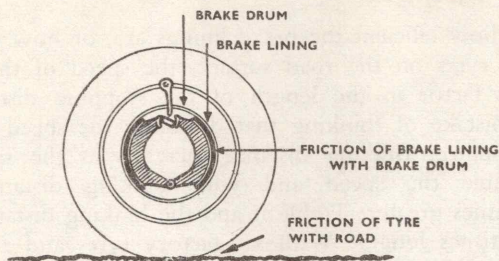


Diagram No. 27

Driving on the brakes (i.e., speeding and braking at corners, bends, etc.) will wear the linings and reduce their efficiency. One does not ride a horse that is likely to take the bit between its teeth and refuse to stop, yet there are motorists who are content to drive a car that is liable to behave in a similar manner. Cars have been known to go over the bank at a bend with fatal results, and all because the brakes would not hold. In one case the brake linings in three of the wheels were so badly worn as to be practically useless.

When there are young children in the car a sudden application of brakes can cause serious injury. Young passengers in the front seat have had their faces disfigured for life through being thrown against the dashboard or windscreen. One little tot sitting on the lap of its mother, who was driving, was crushed against the steering wheel and suffered severe internal injuries. One driver received a fractured skull when struck on the back of the head by his own boots – a pair that had been repaired and had been placed in a rack at the back of the car. He was speeding, had to jam on his brakes suddenly, and the boots hurtled forward at the original pace of the car. Drivers who control their speed seldom have to use their brakes abruptly. On long downhill descents, even when using second gear, it may be necessary to use the brakes before reaching a bend. Refrain from keeping the brakes on for a long time as the friction with the brake drum generates a considerable amount of heat which will cause expansion of the drum and also undue wear on the brake linings. If the grade is so steep as to make continuous braking necessary, then change down to a lower gear and go down on the engine. It saves the brakes and gives better control. This should always be done when driving a truck.

In cases where sudden emergency braking is unavoidable, recent statistics from overseas countries prove that serious injury to the occupants of the front seats can be minimised by the fitting and wearing of approved seat belts.

Braking distance

No matter how efficient the brake linings are, or how effective the grip of the tyres on the road surface, the speed of the car is the determining factor in the length of the stopping distance. Don't make the mistake of thinking that doubling the speed doubles the stopping distance. Braking distance increases as the *square* of the speed. Double the speed and your braking distance will be 2×2 (4) times greater. Treble it and the braking distance becomes 3×3 (9) times longer. With satisfactory tyres and road surfaces the minimum braking efficiency that is permitted by regulation is 44.5 per cent. On this basis the formula for estimating braking distance is as follows:

$$\text{Distance (in feet)} = \frac{3}{40} V^2 \quad (V = \text{m.p.h.}).$$

Example: Braking distance at 50 m.p.h. = $\frac{3}{40} (50 \times 50) = 187.5 \text{ ft} = 188 \text{ ft}$ approximately.

Add to this braking distance the distance travelled in $\frac{3}{4}$ sec reaction time, i.e., $\frac{3}{4}$ of $\frac{50}{1} \times \frac{1760 \times 3}{60 \times 60} = 55 \text{ ft}$.

Total stopping distance = reaction distance + braking distance = $55 \text{ ft} + 188 \text{ ft} = 243 \text{ ft}$ or 81 yards.

Work out the total stopping distances for other speeds; it will help to impress upon you the fact that you can *not* stop in a short distance when travelling at speed. This means that every car carries in front of it a red danger zone. Here is the danger zone of a large car 18 ft long doing 50 m.p.h. which travels $\frac{243}{18} = 13\frac{1}{2}$ car lengths while coming to a stop.

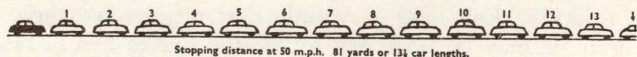


Diagram No. 28

Project

Construct a chart showing the danger zones at 20, 30, 40 m.p.h.

Stopping time

It is as well to know not only how far, but how long it takes to stop. The formula for this is as follows:

$$\text{Stopping time} = \text{reaction time } \left(\frac{3}{4} \text{ sec}\right) + \frac{V}{9.8}$$

V = Speed in m.p.h.

$$\text{Example: } 50 \text{ m.p.h. Stopping time} = \frac{3}{4} + \frac{50}{9.8}$$

$$= .75 + 5.1$$

$$= 5.85 \text{ (6 secs approx.)}$$

Eighty-one yards and six seconds of time are required to stop at 50 m.p.h. Quite a long way and a comparatively long time. Compare the distance with the length of a football field (110 yards).

Driving in towns and cities

When driving in traffic at the peak periods it is not a question of how fast you can travel, but very often how slow you can move forward, especially when in a long queue in a congested street where at times your speed has to drop right down to a crawl of less than 5 m.p.h. and you have to "slip the clutch" to keep the engine revving while you inch slowly forward. When the restraint is lifted and the traffic moves forward again at a reasonable speed, it may be from 15 to 20 m.p.h., there is a danger that the cars will keep too close to one another with the result than an emergency stop by one of the cars ahead causes a succession of nose to tail collisions. The series of bumps may result only in minor damage, but it is this unnecessary drain on the insurance companies that helps to keep up the cost of the insurance premiums. A simple rule for drivers with the good reaction times is to keep a full one car length behind for every 10 m.p.h. (i.e., at 20 m.p.h. keep two car lengths behind and at 30 m.p.h. three car lengths, and so on).

When using this rule you should allow 20 ft for the length of a car. The rule also assumes your brakes are in good condition.

Diagram No. 29 shows why this distance is necessary. If the front car applies his brakes at point A, the rear car must apply his at point B

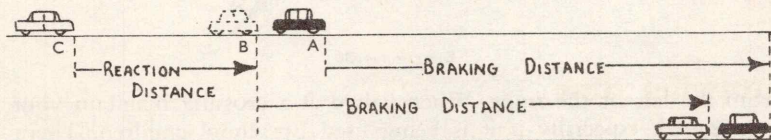


Diagram No. 29

or he will not stop short of the front car. To do this he must have completed his reacting by the time he reaches point B. This means he must be back at point C – a full reaction distance behind B when the front car starts to brake. Keeping pace in a correctly spaced line of traffic demands concentration, and passengers who attempt to converse with the driver should be promptly silenced.

When you come to an intersection controlled by a traffic officer indicate the direction in which you intend to travel – straight ahead, to the right, or to the left. If your car has no left indicator, place your right hand against the windscreen, fingers to the left.

At an intersection controlled by lights, when waiting for the green light do not move forward when the green changes to amber for the other traffic. This light is warning the other traffic to come to a stop and the signals give time for the intersection to clear before your green light comes on to let you through. Moving forward on the amber light is an offence and is only done by impatient motorists who are *not* good drivers, though no doubt they think they are smart.

Pedestrian crossings

Should be approached with caution. It is unfortunate but there are pedestrians who will step on to a pedestrian crossing without looking for approaching traffic. Remember that the pedestrian has the right of way when entering your half of the crossing whether

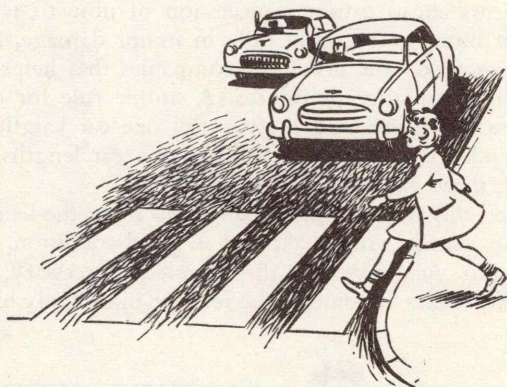


Diagram No. 30

from the left or the right. When halted at a crossing maintain your stop signal, especially if it is being used by school children. There have been accidents to little tots where a driver has stopped to let

them across. After he has beckoned them on, and naturally the children have hurried usually at the run, they have been knocked down by another car which overtook the car halted at the crossing. This, of course, is a flagrant breach of the law, but the defence usually given has been that the driver of the halted car was not showing the halt signal and it was assumed that the car was a parked one – a very poor excuse.

If you see a child running up the footpath towards the crossing that you are approaching slow right down, giving the stop signal to the traffic behind you. Young children have been known to run along the footpath and straight on to the crossing.

Be particularly careful at night. Pedestrians in dark clothing are not easy to see, and a slight bump, scarcely enough to dent a panel, has been enough to cause fatal injury. A white diamond painted on the road surface indicates that you are approaching a pedestrian crossing and should immediately shift your right foot on to the brake pedal ready for instant application.

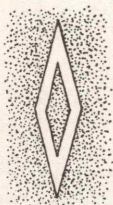


Diagram No. 31



Diagram No. 33



Diagram No. 32

Two other signs which are sometimes placed where traffic in a cross street approaches a busy main thoroughfare are the STOP sign and the GIVE WAY sign. (The STOP sign is also found at some railway crossings.) Merely slowing down to 5 m.p.h. for the STOP sign is not sufficient. *Vehicles must come to a halt* and the driver make sure no traffic is approaching from right or left, before proceeding. There is no let-off for offenders. At a GIVE WAY sign vehicles must *give way* to all approaching traffic and, if necessary, STOP. Both of these signs must be observed. They are erected only at places where the number of accidents that have occurred show that they are essential. Cyclists as well as motorists must observe both of these signs.

Buses

School buses halted to let down or take on passengers must be overtaken on the right at a speed *not exceeding 10 m.p.h.* Even at this speed the driver must be on the alert for the sudden emergence of a child on to the roadway, especially in wet weather where there is a tendency for those getting off the bus to hurry across the road. Exercise similar care when passing ordinary passenger buses.

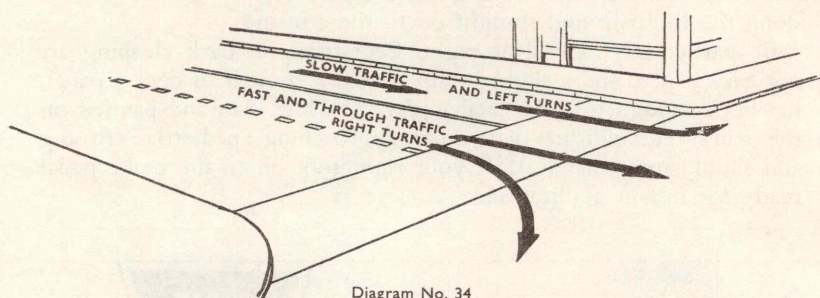


Diagram No. 34

Traffic lanes

In wide streets traffic is not confined to one line as there is room enough for two or more lines to move forward together. In such cases slow traffic, or vehicles intending to turn left at some intersection, keep in the left lane while vehicles intending to turn right keep in the lane closest to the centre of the road. Straight through traffic may use any lane. Approaching some intersections however, an arrow marked on one of the side lanes may indicate that the lane is reserved for turning traffic and in that case other vehicles may not use it. Always change to the correct lane well ahead of an intersection. It is essential that turning traffic should be in the correct lane, otherwise drivers will find themselves in the predicament of trying to turn across a line of traffic coming from behind them.

As you move out of the city into the suburbs you will probably be able to increase speed but do not let the reduction in the traffic beguile you into approaching intersections at the maximum 30 m.p.h. that is permitted in built-up areas. If another car from the left or right should happen to approach your intersection at this speed you know what you would think of the driver. At 30 m.p.h. it takes 34 yards approximately to stop and you have to be fairly close to a corner before you can see what is approaching

from the side road. You would have little chance of pulling up in time to avoid a collision.

Remember what has been said about anticipation when approaching a factory entrance, right-of-way, etc.

This sign means "Slow Down", but unfortunately it cannot be said that all drivers do so. One young man, in his teens, thought that as it was not yet 3 p.m. there would be no children about. He was not aware that little tots frequently leave school before the others. He approached the school crossing at too fast a speed to avoid a little girl who ran onto it, and he broke her



leg — rather a barbarous way of learning what the school sign means. If the school patrols are operating, observe their stop signs. When they are extended *all approaching vehicles must stop and remain stationary until both signs are withdrawn*. While they are extended you cannot cross even if your half of the crossing has no children upon it.

Driving in the country

Enough has already been said about bends and crests in hilly country. On long straight roads with little or no traffic about there is a temptation to speed. Gateways leading to farms and side roads obscured by hedges have witnessed serious collisions. Watching the landscape instead of the road has caused more than one driver to collide with a power pole or run off the road. Be careful when approaching a group of school children walking ahead with their backs to the traffic. Should you meet a flock of sheep or a mob of cattle slow right down and if need be, stop. Do not try to blast a way through by sounding the horn. You will only agitate the animals and cause them to stampede or break in the opposite direction. When the animals are coming towards you they will usually separate as you approach, but when going in the same direction they are inclined to dart from one side to the other just as you are about to pass them. Always give animals right of way and never stop a car near the approach to a bridge when animals are just about to cross it. Keep well back and give them plenty of room to clear the bridge.

Take heed of the road signs. Just as you keep alert for signals for a driver in front of you, so also should you react to the warning signs at the side of the road. Signs like those shown here give valuable information on the road conditions ahead and this information helps you to drive skilfully and safely.



Diagram
No. 36

Here the tendency is to cut the corner and the usual hedge or belt of trees would prevent the driver seeing a vehicle approaching from the opposite direction.

Swinging wide at the left-hand bend and cutting the corner at the right-hand bend is a common fault especially if speed is not reduced. When the road winds downhill the wise driver will change into second gear to save his brakes. Braking on down-hill curves is likely to cause a skid.



Diagram
No. 37

The view of the cross road may be obscured by hedges. Many accidents have occurred through drivers on the cross road approaching the main road too fast. Country roads are usually so empty of traffic that a driver is inclined to feel that his is the only vehicle on the road. If this causes him to relax, or take chances, he will one day meet his Waterloo. Be ready for the mad-cap when approaching cross roads.



Diagram
No. 38

The side road entering the main road at the left-hand bend is particularly dangerous. The driver on the main road will naturally swing in to the left, hugging the edge perhaps, and will be very close to the side of the road when he meets it. A bank or hedge would make it a concealed exit. A stray animal emerging from the side road, or a vehicle, would be fortunate indeed to avoid a collision. Be prepared for an emergency.



Diagram
No. 39

The dangerous T intersection. Drivers passing straight through along the head of the intersection have right of way from either direction. The vehicle emerging from the stem must turn and therefore must give way. The driver turning right from the stem would have to watch for traffic from both sides. It is imperative therefore to slow right down *before* reaching the corner. The *Road Code* contains examples of other signs, most of them being variations of the five already shown. Use the imagination to transform them into actual road situations and you will visualise the type of hazard that lies ahead.



Diagram
No. 40

Treat this sign with the greatest respect. A motorist stands very little chance in a collision with a train. The beginner would do well to treat this sign as a compulsory stop sign and make sure there is no train approaching before moving forward again. You may perhaps have travelled on a bus where the driver has come to a complete stop before



Diagram No. 41

proceeding over a railway line and it is a queer passenger who does not feel that the driver is an exceptionally good one. Make your passengers feel the same about you. Even when there is a fairly clear view of the line on both sides it pays to change down into a lower gear before reaching the crossing. This lessens the risk of stalling on the railway track. Should, however, the car *stall* even when in second gear, and refuse to start, it can be propelled with the battery by using the starter with the car still in gear. Change to low gear if carrying a load (passengers). Extra care is required where there are two tracks. Some drivers have made the mistake, when the train from the right has just passed, of attempting to cross over immediately behind it and have been struck by a second train or railcar on the other line coming from the left and hidden from view by the first train as it passed. Cars and trucks have been smashed to pieces and the occupants sent to the hospital or the morgue. Many of these double-track crossings are controlled by flashing lights or bells or barriers. Always wait till they stop before moving forward. It is an offence to attempt to cross while they are operating. It is worse than that; it is suicidal.



Diagram No. 42

This sign is erected in what is known as "built up" areas and indicates the *maximum* speed permitted. There may be times when the number of vehicles and pedestrians render this speed dangerous. Even 20 m.p.h. can be dangerous at times. Driving at speed that is, *or might be*, dangerous to the public is an offence no matter what your speedometer reading was. Note the colour of the marginal band; it is red, and red means a sign which must be obeyed.



Diagram No. 43

In a Limited Speed Zone, you are required to keep your speed down to a maximum of 30 miles an hour when because of weather conditions, poor visibility, the presence of children, the density of traffic, the condition of the road or other similar reason, speeds higher than 30 miles an hour would not be safe. Where none of these special circumstances apply the 55 m.p.h. limit prevails.

This sign is the de-restriction sign. Some motorists are under the mistaken impression that it permits them to travel at what speed they like. There is always the universal speed limit of 55 m.p.h. which applies throughout New Zealand, and there are also the restrictions imposed by traffic conditions (e.g., poor visibility) that render such a speed as 55 m.p.h. dangerous. Speeds below this maximum can also be too fast for the conditions prevailing at the time.

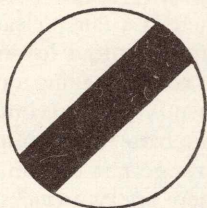


Diagram No. 44

Drivers towing a trailer must remember that their maximum speed limit is 40 m.p.h. This is apt to be forgotten when setting out on a holiday trip.

Overtaking

All vehicles must be overtaken on the right. This means that an overtaking car has to move over either towards the centre of the road if it is a wide one, or on to the "wrong" side of the road if it is narrow. This is one reason why it is forbidden to overtake unless there is 300 ft (100 yards) clear visibility ahead throughout the whole of the overtaking manoeuvre. In most conditions much more than 300 ft is necessary to overtake safely. For instance, take the case of a car travelling at 50 m.p.h. which is overtaking another travelling at 40 m.p.h. Their relative speed is 10 m.p.h. or 15 ft per second. To get past the other car safely the overtaking car must travel at least 90 ft relative to the other vehicle. (This leaves 60 ft between the cars as the overtaking car pulls in.) At 15 ft a second 90 ft takes 6 seconds. In 6 seconds the overtaking car will travel 440 ft. An opposing car could also travel 440 ft in this time so 880 ft visibility is needed for safety.

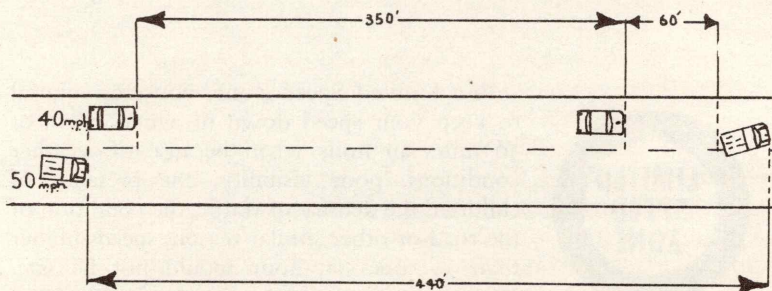


Diagram No. 45

Overtaking near the crest of a hill is just as dangerous. Make it a rule never to overtake unless there will be 100 yards of clear road ahead when you have *finished* overtaking.

Before overtaking look in the rear-vision mirror in ample time to see what is coming up behind. Signal your intention to pull out to the right, sound the horn to warn the driver in front. Avoid cutting back too soon after overtaking. Look in the rear-vision mirror and if you can see the nose of the overtaken car clearly it will be safe to move over to the left. If you should be driving the car that is being overtaken show consideration by moving over as far to the left as practicable and slacken speed a little. You must not overtake where there is a "No Passing" line painted on your side of the roadway, i.e., that is where there is a solid line on your side of the centre line.

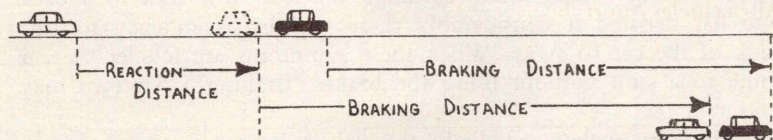


Diagram No. 46

At an intersection, or within 30 ft of one, overtaking is forbidden by law except in certain cases which are listed in the *Road Code*. An overtaking vehicle has to speed up to do so, and speeding up at an intersection is dangerous. Be particularly careful when overtaking a young cyclist near an intersection. They have been known to signal and turn right at the same time. Even when there is no intersection if the cyclist is a beginner and shows signs of wobbling give him a wide berth. Cyclists riding two abreast have suddenly had to swerve to the right to avoid a car pulling out, or a truck emerging from a right-of-way, and the cyclist nearest the centre of the road has been knocked down and killed by an overtaking vehicle. Be on your guard at all times when overtaking. Good driving is patient driving. Hold your horses. You have a large number of them under the bonnet of your car. A "projectile" weighing from 1 to 2 tons, even at 20 m.p.h., has a terrific impact when it strikes anything.

You may at some time be faced with the following situation on a long straight highway. Some distance ahead, coming towards you, is a car, but about midway there is a parked vehicle on your side of the road. If both cars maintain their speeds you will find yourself

in the predicament of passing the parked vehicle just as the other car is about to do so. The impatient driver speeds up to get past the parked vehicle before the other driver reaches it. The sensible driver slows down. He does not attempt to overtake even a stationary vehicle if he will not have 100 yards clear road ahead when doing so. The owner of the stationary vehicle should have parked it as far off the highway as possible. Remember this when you stop to have a snack or to view the scenery, and choose a place to park where you can get off the road.

A flat tyre

Even though a driver does check his tyres before leaving on a journey it is possible to have a puncture *en route*. The escape of air may be slow, or fast. A slow leak in a front tyre will eventually make itself felt in the steering. There will be a drift to one side or the other and a drag when turning. When a slow leak in a back tyre has deflated it considerably there will be a tendency for the back of the car to sway. When these symptoms are felt let the car come to a stop without using the brakes. Braking a flat tyre may ruin it.

If the tyre deflates suddenly the driver must keep his presence of mind. If it is a front tyre the car will swerve to the side of the puncture or blowout. The steering wheel must be firmly gripped and the car kept on as straight a course as possible. The foot is immediately taken off the accelerator but the temptation to stab it down on the brake pedal must be resisted at all costs. Let the engine act as a steady brake until the car is almost at a standstill.

A blowout in a back tyre will cause a sudden sway in the rear of the car. Again the brake must not be applied. The procedure is the same as before. Keep the car on as straight a course as possible and take the foot off the accelerator immediately. Before you start to put on the spare wheel see that the car is as far off the roadway as possible. It is to be hoped that the regular inflation of the spare has not been overlooked. Although it is seldom used it will not maintain its air pressure indefinitely. There is a gradual leakage. When replenishing the air in the four tyres in use remember the spare. It will need some air also.

Overheating

The level of the water in the radiator should be checked at least once a week. A leak will sometimes develop at one of the hose connections to the radiator and remain undetected until the driver notices the smell

of an overheated engine. If the engine is hot take care when removing the radiator cap and add water while the engine is idling.

Fuel Gauge

Always glance at this when you turn on the ignition preparatory to leaving the garage. It is a mistake to set out on a journey with just enough petrol to get you there and back. Moreover, by using the dregs in the petrol tank you run the risk of blocking the jet in the carburettor. The aperture in the jet is very small and a speck of dirt will easily clog it.

While on the subject of saving petrol there are several common-sense practices to observe:

1. Avoid racing the engine. Racing a cold engine to warm it up not only consumes petrol at an excessive rate, but also causes wear and tear in the engine as the oil is not sufficiently warm to lubricate properly.
2. Excessive use of the choke increases petrol consumption and the raw petrol sucked into the cylinders not only dilutes the oil, but also increases the carbon deposits in the cylinders. Black smoke from the exhaust indicates too rich a mixture.
3. Frequent quick acceleration with consequential application of the brakes at intersections, etc., causes considerable waste of petrol. A steady pace will get the driver to his destination almost as quickly as a series of spurts and slow-downs.
4. High speed reduces the miles per gallon at a startling rate. If the speed is increased from 30 to 50 m.p.h. approximately 20 per cent more petrol is required. The chief factor in the increase in the petrol consumption is the wind resistance which increases in proportion to the *square* of the speed. The design of the car has much to do with the amount of resistance to the air, but well known makes of cars when tested gave the following results:

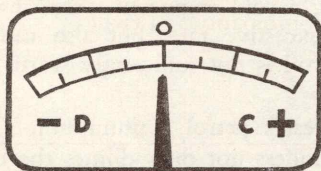
	<i>100 Miles at Steady Speed</i>	<i>At 40 m.p.h.</i>	<i>At 60 m.p.h.</i>	<i>Extra Consumption</i>
A consumed		1·9 gals.	2·8 gals.	·9 gal.
B ,,		2·5 gals.	3·3 gals.	·8 gal.
C ,,		3·9 gals.	5·1 gals.	1·2 gals.

These figures prove that speed does not pay. Road accidents also prove it.

5. Under-inflated tyres have a greater rolling resistance over the road surface and more power is needed to propel the car. Low tyre pressure means low milage per gallon.

The ammeter

The ammeter is a guage which shows whether the battery is losing or receiving electric energy. The battery is a reservoir. It supplies the electric current required to start the engine, sound the horn, and light the headlamps. When the car is on the move the generator should produce sufficient electricity not only to supply the spark plugs and keep the engine running, but also to charge the battery. If the car is equipped with an ammeter consisting of a graduated



AMMETER

Diagram No. 47

face the central position is zero and the pointer should rest on this mark when the battery is not in use (i.e., the ignition is turned off and no lights are on). If it fails to do this and the pointer is slightly over on the discharge side there is a "short" somewhere and the matter should receive immediate attention.

Not only will the battery soon drain away its store of electricity but the short may start a fire.

Always glance at the ammeter when you turn off the ignition to make sure the indicator is at zero. Some absentminded drivers have left the key in the ignition switch overnight at the "on" position and found the battery flat or too weak to start the car the next morning.

If you notice that the pointer occasionally flickers from charge to zero have the matter attended to without delay. The charging rate when the lights are on will not be great, just slightly on the + side of the centre mark when the engine is running at speed. At slow speed it will probably show discharge. When the engine is idling without any lights turned on, the ammeter will show discharge also, because the engine is not turning fast enough for the generator to produce the amount of current required. The engine is then said to be running off the battery. It should be evident, therefore, why allowing an engine to idle for a long period is extravagant. It wastes both battery power and petrol.

If in place of a gauge there is a red-light indicator this will show red whenever the battery is discharging and disappear when charging.

CAR CONTROL

The knowledge and application of car control is the basis upon which the technique of good driving is built. It must have a solid foundation; any weaknesses in practice or theory will be evident in a driver's performance. Car control may be defined as:

A system or drill, each feature of which is to be considered, in sequence, by the driver at the approach to any hazard. A hazard may be any physical feature, such as a crossroad, traffic circle, intersection, bend, or hill crest, or any potentially dangerous traffic situation developing ahead.

By correct application of car control, the car will at all times be:

- (a) in the right place on the road;
- (b) travelling at the right speed; and
- (c) with the right gear engaged.

There are certain linkages of control that must always be used in sequence and should be considered in combinations of two.

Driving Mirrors and Signals Hand signals, flashing lights, trafficator signals, and those made with the horn. In making a habit of doing this, drivers will find (a) they will never fail to give a signal if there is following traffic, and (b) signals will be given in plenty of time both to drivers ahead and those behind.

Driving Mirrors and Brakes This means that when drivers pull up for some obstacle ahead they will instinctively gauge the proximity of the nearest vehicle following. Many vehicles are equipped with braking systems which incorporate a "Stop" warning light, but if the following driver is keeping unwisely close, this habit will remind the driver to give a clear slow-down signal by hand in plenty of time before braking.

Brakes and Steering Remember that the steering of your vehicle is not improved by braking as you turn the corner. If the road is greasy, wet, or icy and you brake harshly while turning there is a risk of a four-wheel skid – the worse sort there is. Brake before the corner, at which time the car is travelling in a straight line or nearly so. If you misjudge your braking you will need to try again. Do so with discretion as otherwise the car will slide bodily.

Steering and Acceleration A driver is reminded to place a car properly when starting from rest, or as he accelerates carefully round

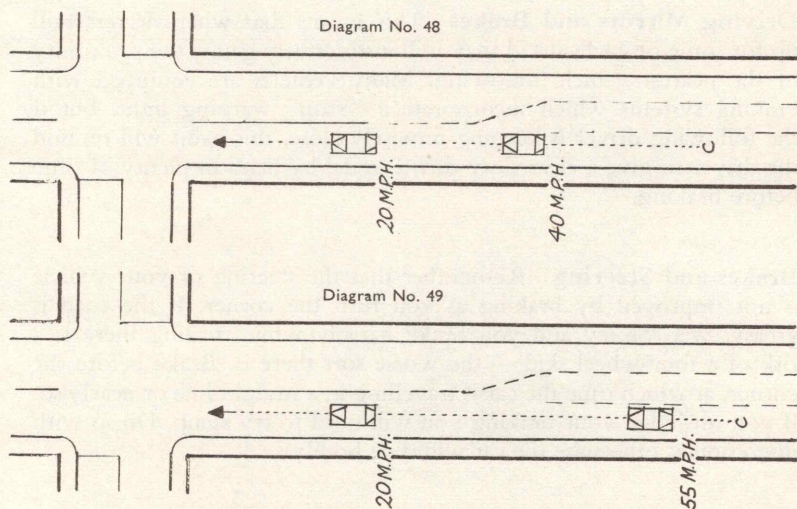
a corner. Remember the skidding effect the combination of steering and acceleration can have if used unwisely.

Accelerator and Gear Lever When driving, drivers should use successively rising gear rates with firm depression of accelerator in order to increase speed promptly and lower ratio (or ratios) with a relaxed accelerator in order to help the brakes to reduce speed. The last procedure usually applies to approach to a corner or an involved traffic situation, and enables the driver to be ready to accelerate away from a hazard with minimum amount of wear and tear to the engine.

Gear Lever and Clutch Except for an occasional easing in heavy traffic, the clutch is only to be used for starting, for gear changing, and the last few yards in stopping.

Timing of a situation

Let us take two examples (diagrams 48 and 49) showing how speed of approach and the braking distance can influence the timing and control of a vehicle.



TIMING OF A SITUATION

First Example The driver of a car approaching a crossroad at 55 m.p.h. must see the hazard in good time. It is obvious to him at this stage that he cannot negotiate the crossroad at this speed, and he should assess what speed is suitable. He quickly decides upon the course he intends to follow and applies the principle of "mirrors and brakes" deliberately. Braking, being a hazardous operation at this speed, must be spread over a long distance of the road to reduce speed to say 20 m.p.h. and so we find that the application of car control will cover a considerable length of road owing entirely to the braking distance (see diagram 48).

Second Example The same driver approaches the same crossroad at 40 m.p.h. As before he must see the hazard in good time, but he can select his course when nearer to it because of his lower speed. For the same reason he commences to brake at a point nearer to the hazard than if he had been travelling at 55 m.p.h., but he will arrive at a speed of 20 m.p.h. at the same distance from the hazard as in the previous example.

It will be seen from diagrams 48 and 49 that speed of approach and braking distance must decide the point at which the system of car control is commenced. The result is the same in both cases, for the gear change point is exactly the same and there is time and distance for the remaining actions to follow accordingly.

Road conditions do not always demand alteration of course, speed, or gear; even so, every feature is individually considered. For example, a driver approaches a minor crossroad as he travels at 40 m.p.h. on a main road in flat, open country. He observes the crossroad well ahead, and the main road and both converging roads are absolutely clear. He considers his existing course satisfactory. His speed (40 m.p.h.) is quite safe, there is no following traffic, and there is no need to brake. Still the roads remain quite clear of other traffic and the gear ("top") is quite suitable for the speed and prevailing conditions. He uses the mirrors again; there is still no following traffic and there is no need for any signals as his intention is to go straight on.

The converging roads remain quite clear with perfect visibility and there is thus no need to sound the horn. He passes over the intersection at 40 m.p.h. with perfect safety. In this example the driver has considered every feature, and being satisfied with the conditions ahead of him at each stage, he makes no change. Road observation by the driver is most essential and will be dealt with more fully but it must be mentioned here because it is so closely allied to car control. Only by perfect observation will the driver become acquainted with traffic conditions prevailing as he approaches a hazard and when he reaches it.

In diagram 50 we see the V.1, 2, 3, and 4 spaced along the road from the beginning of the approach to the intersection right up to the hazard. Straight lines drawn from each point to the built-up corner, and then extending across the converging roads, show how the driver's view into converging roads develops.

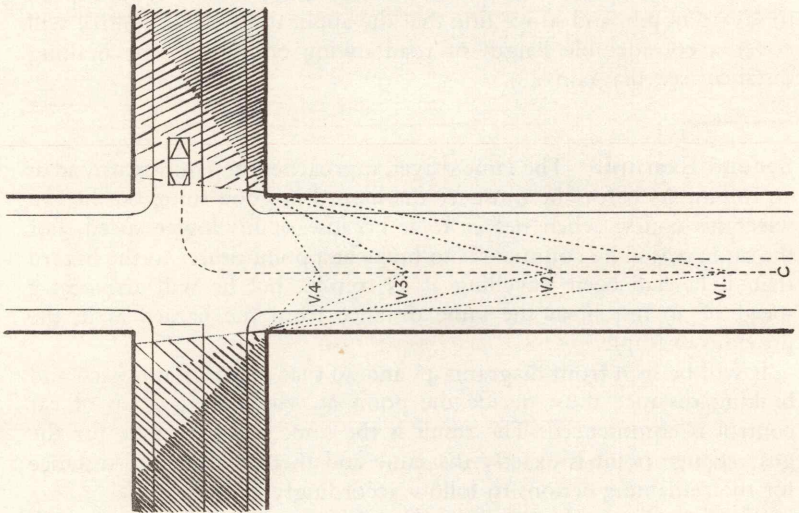


Diagram No. 50—Visibility when approaching a crossroad

At V.1, when he has selected his course (which is to turn right) and has moved to the left of the centre line his view is negligible. From V.1 to V.3 the view improves very little, which shows how necessary it is to approach the hazard with speed care. From V.4 to the actual crossroad the view round the corner begins to open up and rapidly improves, and as this is happening the driver should make his decision to increase speed, slow down, or stop according to the position and behaviour of other road users.

Zones of visibility

To assist the driver to study the theory of this problem, and to improve his driving method, it is possible to divide the road scene into zones or areas which may be termed zones of visibility and invisibility.

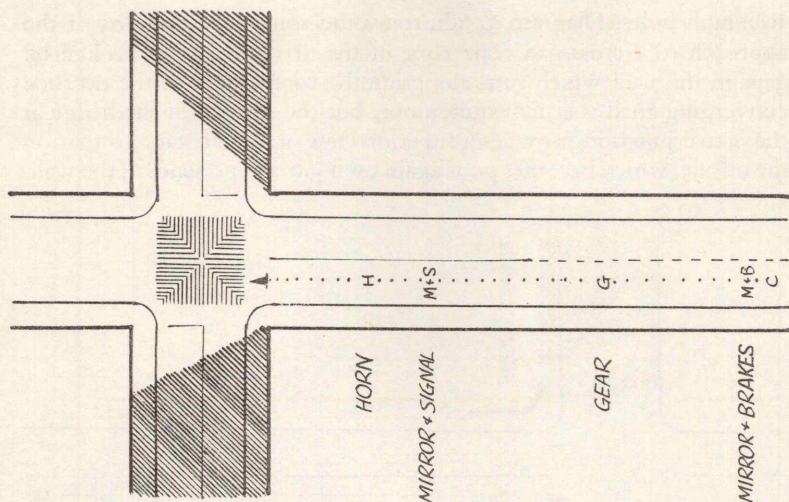


Diagram No. 51—Zone of danger – suburban crossroad

Diagram 51 illustrates a crossroad in a suburban area. A driver approaching the crossroad from the bottom of the diagram and intending to go straight over the intersection may become aware of its presence by seeing the continuous line up to it. If seen in good time it should be sufficient warning of an approach to a hazard. He will then have time to prepare himself for any eventuality by applying the procedure of car control. The shaded areas in the converging roads are zones of invisibility and at point H they have receded to a minimum and the zone of visibility is now reaching its maximum size. The shaded area may be termed a zone of danger, for it is the intersection of the crossroad where an accident may occur. When the driver gets close to it his position, speed and gear must be such that he is able to take one of the two alternatives:

- (i) Slow down or stop to allow free passage of other road users.
- (ii) Accelerate across and out of the zone of danger if satisfied that no other user will be endangered or inconvenienced.

The observant driver will take full advantage of views across open spaces and through breaks in low positions in hedges, fences, or walls, to get that valuable, if brief, view into converging roads which to some drivers appear totally obscured. He will also observe the configuration of the countryside generally, and will often be able to judge the severity of any bend or gradient by the position, etc., of trees, hedges, or

telegraph poles. Diagram 52 illustrates the zones of invisibility at the approach to a crossroad. The zone of the driver's sight is broken by gaps in the wall which runs alongside the road. View to the nearside converging road is at first quite poor, but the setback of the hedge at the actual junction provides a superior view at a later stage to that on the offside, which becomes poor again owing to the presence of the wall.

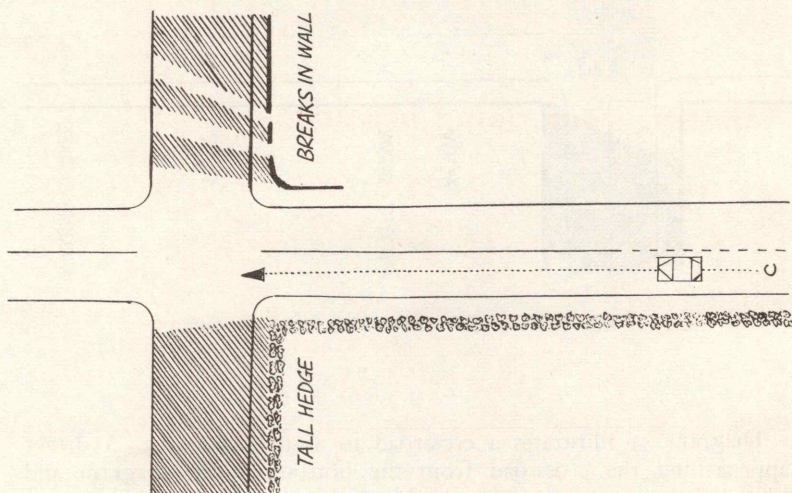


Diagram No. 52—Zone of visibility at approach to crossroad

The length of a view a driver obtains at bends and curves on a country road which is bordered by hedges, trees, or other obstructions can to a certain extent be increased or decreased by the positioning of the car on the roadway when approaching such places, so this must also be kept in mind.

Again one of the most important aids to successful town driving is local knowledge. To know the situation at intersections, lights, signs, one-way streets, traffic circles, and the type of conditions prevailing is undoubtedly of great assistance to a driver because he then has some idea of what to look for.

Town driving demands great power of concentration, road observation, the ability to react quickly to changing situations, and considerable driving skill. Views ahead are frequently restricted owing to density of traffic. It is not wise to focus all ones attention on the vehicle immediately in front, and a sensible distance should be maintained behind it so that a view of traffic movement two, three, or more vehicles ahead may be obtained from time to time.

MOTOR CYCLING

The Experts It is easy to pick out the really expert motor cyclist or power cyclist. To see him pass by is sufficient. One observes the manner in which he sits his machine; he is so obviously at ease – riding, yes, but almost as relaxed as if at home in an easy chair. And the impression that here is a true expert is immediately confirmed by the fact that he travels along the highway without flurry or fuss or noise.

Adjusting your riding position

On your riding position depends to a large degree the mastery of your machine: your ease of control, your comfort. Your machine has been made adjustable in many respects; it can be made to fit you exactly; see that it is adjusted to your requirements before you even start to ride.

Handlebar The handlebar should be adjusted so that the grips are either horizontal or inclined slightly downward, so that the rider's hands rest naturally on the grips.

Control Levers Both the clutch and front-brake controls should be arranged as close to the grips as their design permits, with the tips of the levers a little lower than the ends of the handlebar, to give maximum leverage and delicacy of control.

Saddle The rule is that the saddle should be set so that the rider has no tendency to slide either backward or forward.

Footrests These should come roughly beneath the nose of the saddle. The essentials here are that the rider can poise on his footrests – automatically taking his weight on them when the machine hits a bump; that they are not so low that one of them may foul the road when the machine is heeled over on an adverse camber; and that the rear-brake control and the foot gear change can be operated easily. The adjustment should be made so as to ensure that, with the rider normally seated, the brake pedal is beneath the toes and can be operated without lifting the foot from the rest. Similarly, the right toes should be able to “stroke” the gear lever (which is itself usually adjustable) up and down without the foot leaving the footrest.

Feet When riding the feet are approximately horizontal, with the toes never appreciably downward, which can result in a foot being trapped between the footrest and the ground; also, the foot

gear change is always operated with the toes: the heel should never be used for this purpose.

Braking A valuable feature of a motor cycle is that there can be much less time-lag in applying the brakes than is the case with the majority of vehicles. As previously described, one can ride with the toes poised over or even touching the brake pedal, yet not apply it, and also have two fingers resting on the front-brake lever.

As will be gathered from a later paragraph, the expert places chief reliance on his front brake, it being the more important of the two. Hence the lever must be an easy stretch for the gloved hand. Incidentally, slight slack in the front-brake cable may make it easier to apply the brake delicately, though obviously there must not be too much slackness.

Body Position The expert rider sits relaxed, but this does not mean that he sits like a sack of potatoes. He rides with his back slightly bent, hands resting gently on the handlebar grips with legs and feet so positioned that if the machine strikes a bump there is an automatic easing of his weight in the saddle. And when he heels over for a bend, normally he leans gently over in unison with his mount. Only if forced in emergency to take evading action – to lean the machine farther over (inwards) – does he lean his body away from the machine (outwards).

Handlebar controls

From closed to fully open the twistgrip which operates the throttle should move easily and with complete smoothness, yet the friction adjuster should be set so that the grip will remain in any intermediate position. There should be no “backlash” in its control cable, so that, right from the closed position, the twistgrip should give immediate response. Without these conditions no motor cycle can be ridden efficiently. On the throttle work depends the smoothness or otherwise of the machine’s acceleration, the neatness of the cornering, and, in appreciable degree, the rider’s safety when road surfaces are treacherous. “Blipping” of the throttle is irritating to others and is never necessary.

Remember that it is most important to keep controls functioning perfectly. Bear in mind that a throttle control cable can operate smoothly and lightly only if it is arranged so that it runs in easy sweeps, is undamaged, and is lubricated. This applies equally, of course, to the other control cables. Check, too, that the nipples in the handlebar levers of the clutch and front brake, especially the

latter, are free in their housings and, with a trace of lubricant, move without jerkiness when the controls are operated.

Rear-brake Control Smooth operation of a rear brake usually depends on the lubrication of the pivot for the pedal and of the pins in the yoke-ends. There may also be a lubricator for the spindle of the cam lever; here care is needed since too frequent or excessive lubrication may result in oil or grease finding its way into the brake drum.

Moving Off When you move off get the engine ticking over, engage bottom gear, if necessary rocking the machine a few inches backward and forward to assist the gears to engage, and then operate the clutch and throttle in unison so that the machine glides away. Almost as soon as you are under way, engage second gear. Then, when sufficient speed has been gained, but with no high revs or excessive noise or fuss, change to the next higher gear, until you are in top. Have your feet on the rests before the machine has covered a couple of yards – legs, thighs, and feet are the media through which a motor cycle is controlled – eyes are focused well forward and body relaxed, except for that slight poising on the footrests.

Roadcraft Almost every yard of the way there is a lesson for those with eyes that see. There may be a manhole ahead, some potholes in the road, half a brick or a patch of road which might be slippery; without seeming to deviate from a smooth path the machine is steered to one side or the other, whichever is preferable having regard to traffic conditions and what lies or what might lie ahead. *The secret is to be for ever looking and thinking ahead.*

Using the brakes to perfection

A good rider seldom, if ever, uses his brakes violently. He does not allow himself to be trapped, with the result that seldom is he compelled to make a crash-stop.

He makes use of his brakes, and is always at the ready to apply them, but usually employs them with the gentleness and the smoothness with which he operates the clutch.

Stopping Distances In traffic and on all those occasions when it may be necessary to apply the brakes in a hurry, his toes are poised over or are actually touching the brake pedal and two fingers of his right hand rest on the front-brake lever. This can reduce the time required to apply the brakes.

Knowing the distances in which one can stop is obviously very important. It is a wise rider who knows his braking distances under good conditions and has a shrewd idea of what stopping power is available when road surfaces are slippery.

Braking When a motor cycle is braked the effect is to throw an increased amount of weight on to the front wheel. It is, of course, weight which gives wheel adhesion and therefore the grip needed for braking.

When a road surface is slippery, it is often best to use both brakes gently to reduce the risk of a skid.

With a motor cycle, a front-wheel skid is more difficult to correct than a rear-wheel skid, but it is equally true that a front-wheel skid is much less likely to occur, provided that the two points covered in the following paragraph are borne in mind.

Brake When Vertical The first point is that the brakes of a motor cycle should never be applied hard unless the machine is vertical and travelling in a straight line; if the road surface is slippery, braking *must* be carried out with the machine vertical.

The second point is that if the road surface slopes away to one side the brakes must never be applied hard; if there is a camber and braking is essential one should steer for the bottom of the camber.

Should the rider be heeled over at the time when braking is called for, he should bring his machine to the vertical and only when it is vertical do the brakes go on hard. For a crash-stop on a coarse-texture road which affords anything approaching a rack-and-pinion effect, the brakes go on really hard but without a jab or stab; there is "iron" in the action, but some degree of gradualness. Normally, the front brake is made to bite slightly in advance of the rear one and full advantage is taken of its greater retarding effect.

Experts' Braking "Tip" Let us assume that, as often occurs, the telegraph poles go straight on but the road turns sharp right; it is dark, and stupidly we imagine that the road must, like the telegraph poles, also continue straight on. Were we to attempt to negotiate the turn at the speed we are travelling, we would run off the road, while to brake hard with the machine heeled over for the bend would inevitably mean a skid and probably a tumble. What we do, therefore, is to hold the machine to its straight line, heading for the bank or kerb. With the machine vertical we can

brake to the maximum. Thus, perhaps not until the gutter is reached, we reduce the speed to the extent that enables the turn to be negotiated safely.

Bend swinging

Left-hand Bends On entering a left-hand bend which appears to be free from traffic the rider should be out towards the middle of the road but not too close to the centre line. His path or line enables him to get the earliest possible intimation of the presence of anything, moving or stationary, there may be round the bend. *He must avoid encroaching on the other half of the road.*

Safety Margin All will be well, of course, if the rider is following the advice in the *Road Code* that one should always be able to stop in the distance one can see is clear. This advice is very sound, but the wise old hand knows that it may not be a matter of having to stop in time to avoid hitting a stationary object: there may be a moving object coming from the opposite direction – some one suffering from impatience (one of the deadliest sins in roadwork) may be overtaking another vehicle and in so doing be trespassing upon the wrong side of his road. This can happen and does happen; and if one is to keep a whole skin one must always be prepared for this sort of thing.

Cross Roads And Turnings And what applies on bends is equally applicable at cross roads and at side turnings. One places one's trust in nothing and in no one. The cross roads may be controlled by traffic lights and the latter have just changed in the rider's favour, but if he is at the head of the stream he should always look right and left before accelerating across in case a driver tries to beat the lights or failed to see them.

Right-hand Bends The wise motor cyclist is ever on his guard, knowing from experience that, rare though these occurrences are, there are few long-distance runs on which some example of crass folly will not be noted. The fact that he himself keeps out of trouble is a result of, among other things, the path he takes. Just as he seeks to see round a left-hand bend so, by entering a right-hand bend close into the left side, he obtains the maximum line of sight round the bend. Where there is a blind side turning to the left, he aims to be that yard or two out as he passes its mouth.

Overtaking

If we follow an experienced rider on a twisting road which is carrying a lot of traffic we are almost certain to notice several points of interest. He is never close to the tail of a vehicle ahead if its dimensions are such that his view will be obstructed and prevent his seeing a parked vehicle, cyclists, road signs, pedestrian crossings, etc.

Passing a Car If a car is not being held continuously to its path – if the driver seems to be interested in his passenger, in lighting his pipe, or in the scenery, rather than his driving, our expert gives a gentle, “Please I am here and wish to pass” message by means of his horn and, when he does pass, he seeks to go by with what may seem a somewhat excessive amount of clearance. The really worth-while rider never shoots past on the basis that there is room and therefore no need to worry; he knows what his own reactions are if some one swishes past him without warning.

Passing a Lorry It is when an expert closes up on a vehicle which blanks off much of the road that there are most points to be learnt. He keeps a good distance behind because in this position his view is less obstructed. If the road curves to the left he, with his single track, can have a look to the left of the vehicle. Should it curve right, then he can have an excellent view to the right. If, however, the road goes straight ahead, he can lean over to the right, study what lies ahead and, should it not be safe to overtake, he tucks himself in behind the four-wheeler before trouble can ensue.

He is always on the lookout for anything which may cause the vehicle ahead to swing out or slow down (e.g., a cyclist, a child, a parked van).

Cars' Blind Spots Car drivers have not the unobstructed view enjoyed by motor cyclists. There are blind spots caused by wind-screen pillars and window frames, and the rearward view is usually confined to a comparatively small back window. A motor cyclist is not a large object, and even a reasonably careful car driver may not detect his presence. The driver looks in his mirror, sees what appears to be a clear road behind and then, just as a motor cyclist is about to overtake, swings over in order to stop at a house on the right.

Realising the other fellow's disabilities, the experienced rider makes a point of countering them, in this case by making sure, before he seeks to overtake, that his presence is known. He also goes out of his way to facilitate the passage of others, whether they wish to overtake him or are coming from the opposite

direction. In both cases he will make a slightly exaggerated swing towards his own gutter, thus saying, in effect, "please carry on" If the other vehicle wishes to overtake, he may, in addition, give a wave-on signal. Courtesy and thoughtfulness do more than merely breed good feeling.

Picking the best path

What counts for most in trials riding is path-picking and clever use of the throttle. On an observed hill the star rider is always thinking ahead, he may purposely pick a poorish path here, to be able to place himself to best advantage at a more difficult part higher up. Always his path is chosen with good reason. It is very much the same on the road. He notes the road surface automatically – every yard of it. Subject only to traffic and to any other controlling factors, his wheels traverse the best surface. If the roads are slippery, this will be those parts whose texture is the roughest. An eye for camber, picking the least-worn parts of road, gentle throttle work, and equally gentle braking – these, and avoiding sudden changes in direction, are the means whereby skids are avoided.

Tyres A new machine has, of course, unworn tyres, but as time passes, remember the importance of having first-class tyre treads – especially on the front tyre. The pressures should be those recommended by the makers and should always be tested by gauge and increased as necessary, every week or 10 days.

Obstacles Much can be learned from watching reliability trials – points which are of great value in road work. Note how, if there is a rock-step, the expert places his machine dead square to it and, with his machine vertical, lifts over it poised on the foot-rests; this has affinity with raised manholes, deep potholes, and a half-brick which was spotted almost too late. See, too, how, if there is a patch of loose stones, he enters the loose gently and accelerates through, knowing that this gradual acceleration will help the machine to cleave a straight path. If the loose is on a downhill bend, and there are frequently quite a lot of loose stones on main-road bends after tar spraying, all his braking will have been carried out while the machine is on an even keel and the actual negotiation of the bend will be with the machine travelling very slowly so that there is no need to heel over to an extreme angle.

Riding at night

Goggles At Night Because of nocturnal insects, apart from the ravaging effects of grit and high-velocity air, the old hand wears goggles at night just as he does in daytime. He makes a point, however, of cleaning their lenses before any night journey and generally will give them a polish when he stops to refuel. He uses goggles with clear lenses for night runs because tinted lenses inevitably reduce vision. Make sure your goggles are non-splinterable and have a wide field of vision.

Keep Glasses Clean Headlamps dazzle less and give a better light if their glasses are clean. Therefore, it is worth cleaning the glass before any night run. If the glass becomes bespattered on the journey, even a wipe with the gloved hand may be helpful.

They term it roadcraft

Things like these are observed by the rider who is versed in roadcraft:

A van driver has stepped smartly into his vehicle; he may start off and, on doing so, pull outward into one's path.

There is a hint of smoke from the exhaust of a parked car.

That motor cyclist has just kick-started.

A dog shows interest in another on the far side of the road.

A car or van is converging from the road on the right, a road which joins ours at an angle; the driver will probably have great difficulty in spotting us.

The driver ahead has signalled that he wishes to turn right and has eased out to the middle of the road; there is opposing traffic, so it is probable that automatically he will steer slightly to the left again, thus reducing the space we have available.

The cyclist ahead starts looking over his right shoulder; he is almost certain to pull out slightly without realising the fact.

The car which swings right a trifle may not be turning right at those cross roads, but left, the driver merely having sought to ease his turn.

These are all warning signs, each taken in almost subconsciously by the experienced. The list can be long and is always being added to as experience mounts, but if we know the sort of thing to look out for we ourselves can begin building our own lists.

Animals Animals on the highway are a source of a high proportion of accidents to motor cyclists. Sheep which break through

fences bordering fields are a hazard which cannot be foreseen. In spite of his natural inclinations, the old hand does not swerve for a dog, cat, or rabbit. He continues on his path, gripping the handlebar instead of using it merely as a rest for his hands. If the animal is left to take evasive action, the probability is that all will be well. On the other hand, had the rider swerved not only would the animal have been forced into a guessing game, but the rider, if his machine had hit the animal when canted over, might have been thrown. Hence there is nothing inhuman in maintaining a straight path, gripping the handlebar, and poising on the footrests. The same technique applies to fowls and the majority of other birds and beasts.

Skill in Roadmanship There can be a real kick on every run in applying one's roadmanship and roadcraft. In the early days of motor cycling the challenge lay in handling a difficult machine which had a penchant for lying down at the sight of a path of grease; today we have motor cycles which are amazingly controllable, and the call for skill lies chiefly in this matter of roadmanship.

The expert's riding kit

Headgear For the head, a good motor cycle safety helmet is strongly recommended: make sure your helmet is an approved type and carries the standard mark. This affords a measure of protection which can be a saving factor. Motor cyclists involved in road accidents suffer head injuries far more often than any other form of injury.

The helmet must fit properly and be worn neither on the back of one's head nor canted to one side; and the straps need to be properly adjusted.

More accidents occur in built-up areas than on the open road. Therefore, those who, in their wisdom, use safety helmets on long runs are especially wise to use them also for their about-town journeys, particularly as one can be hurt just as much by a fall at low speed as by a fall at higher speed on the open road. The safest course is to wear your helmet at all times when riding.

Pillion riders

Pillion riders should sit close up to the rider and, on bends and corners, heel over with them. Unless very experienced, they are wise to place the palms of their hands gently on the rider's hips.

Giving hand signals should be the prerogative of the rider. The old hand following in the rear is suspicious of any signals given by a pillion passenger.

Power cycles

The same age restriction applies to the riding of these machines as with motor cycles and motorcars. The rules for motorists apply equally to power cyclists. Motorists often misjudge the speed of power cycles. You should therefore take extra care, particularly at intersections. The same applies to power cyclists regarding the wearing of safety helmets as to motor cyclists.

Right of Way

The following diagrams from the *Road Code* illustrate the main applications of the right-hand rule. Drivers should, however, never assume that because they have the right of way they will always receive it. Make sure first. It is not derogatory at all to yield the right of way even when you are entitled to it, and it is always good sense to avoid a collision.

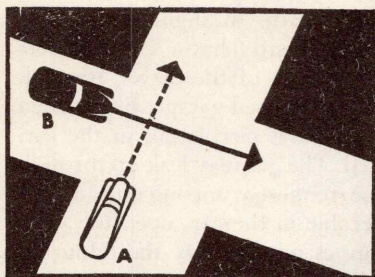
Always treat motor cycles, cycles and power cycles as vehicles. There have been too many cases of drivers failing to give right of way to cyclists at intersections. Intersections of the Y-type and those where a curved road merges with a straight one are always a problem. The most sensible thing to do is not to assume that there is any right of way at such junctions, but to watch the other vehicle and refrain from risking a collision.

Remember that when making a turn at an intersection you also give way to pedestrians that may be crossing at the time.

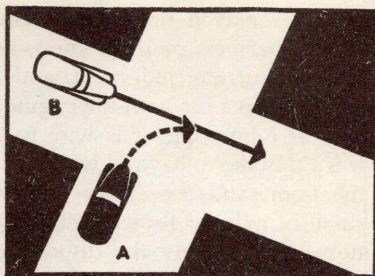
When you hear the siren of an approaching fire engine pull over to the left and stop if this seems desirable to leave ample room for the engine to get past. Give it right of way no matter where you are. The same consideration is also given to an ambulance, police, or traffic car.

The "Road Code"

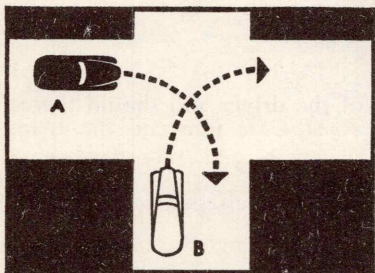
This should be studied from time to time, there is so much to learn. Be sure you know the answers to the questions it contains, especially those prepared for motorists. The code may be obtained from city, town, and county councils or from the nearest local branch of the Transport Department. The Wellington office frequently receives requests from towns far away where supplies could be obtained locally.



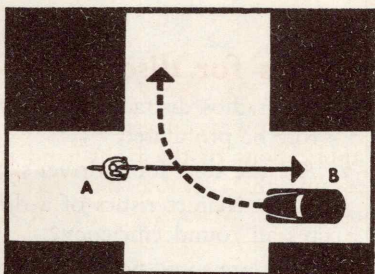
"B" gives way to "A"



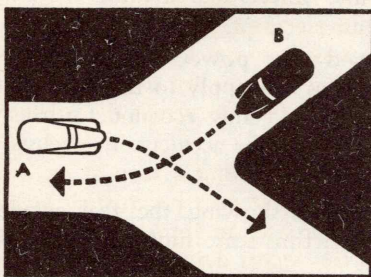
"A" (turning vehicle) gives way to "B"



Neither vehicle has right of way since both are turning right—road courtesy prevails.



"B" (turning vehicle) gives way to cyclist "A"



Neither vehicle has right of way since both are turning right—road courtesy prevails.

Diagram No. 53

Carbon monoxide (CO)

This colourless, odourless, and tasteless gas is produced in the combustion of petrol and is always present in the exhaust from a car. Poor ignition and faulty carburettor adjustment increase the amount of CO produced, and leaky gaskets or a perforated muffler lets it escape into the car. The gas acts quickly and without warning. An engine idling in a closed garage can generate enough CO in a few minutes to

render a person unconscious and cause death. In slight amounts it causes dizziness or drowsiness, and consequently has a serious effect on the alertness, judgment, and reaction time of the driver affected. Never sit in a car with the engine idling in a closed garage. Even when the car is moving, it is wise to see that air is circulating in the car. It is a mistake to have all windows closed. The gas may leak up through the floor, and the driver suddenly be rendered unconscious. If the smell of exhaust fumes becomes noticeable in the car, open the windows immediately and dispel these fumes which carry the odourless monoxide. Never take chances with this gas. It gives no warning and is deadly.

Topics for discussion

1. Car radios distract the attention of the driver and should therefore be prohibited.
2. Are the tests for a driver's licence adequate?
3. What characteristics of a driver should be assessed to determine his all round efficiency?
4. Why are some people accident prone?
5. Would the number of accidents be reduced by increasing the number of traffic officers and making the penalties for offences more severe?
6. It has been said that power makes people overbearing and inconsiderate. Does this apply to the motorist? Give reasons for your opinion. Would this account for the fact that, over a period, 55 per cent of the accidents to cyclists were due to faults committed by drivers.
7. Would shock films showing the real accidents and the pain suffered by the victims scare motorists into exercising more care when driving?
8. Some motorists adopt the attitude that when there is no traffic officer in the vicinity it is not necessary to be so particular about observing the rules of the road. Should, therefore, all traffic officers wear plain clothes and use private cars?
9. Should offenders undergo a period of training before being permitted to resume driving? Which offences should be included under such a scheme? How and when would the training be carried out?
10. Man has been described as "a bundle of habits". To what extent does this apply to the motorist? What habits come to his aid in an emergency?

11. Some people maintain that a road with a flat surface develops pot holes more quickly than a crowned road which drains the water to the sides in wet weather. Discuss these two types of roads from the motorist's point of view.
12. It is considered by some that there would be fewer accidents at intersections if the rule were altered to give right of way to the traffic from the left. Does a driver have better visibility of traffic approaching from the left than from the right? Which traffic gives him the longer time to stop to avoid a collision? What is the primary cause of accidents at intersections?

TOPICS FOR ADDRESSES TO LEARNERS

1. Skill cannot be acquired merely by reading, listening, and watching. Describe the various movements and manoeuvres a learner should practise to become proficient in driving a car. Explain also why the learner should refrain from watching his hands and feet when operating a car. Compile a list of the *habits* that have to be established through careful practice.
2. Explain what is meant by reaction time and why it differs in the same person at different times. Can a driver improve his reaction time and, if so, how would he go about it?
3. Explain how gravity, momentum, and centrifugal force effect the control of a car.
4. Explain how to change down from second to low gear without grating the gears, giving reasons for the movements advocated.
5. Parking in a narrow space is not easy. Describe with diagrams how it can best be done. Name the various places where a motorist should never park. Give some advice about parking on slopes.
6. What are the various causes for an engine overheating, and what care should be taken when adding cold water to a radiator that is steaming?
7. Motoring is expensive. Explain how expense can be curtailed:
 - (a) In the consumption of petrol.
 - (b) Wear of brake linings.
 - (c) Wear of tyres.
 - (d) Wear in engine and gearbox.

8. From your own driving experience explain:
 - (a) Any narrow escapes you have had.
 - (b) The types of intersections where extra care is required.
 - (c) What you have found most difficult when learning.
9. Explain why on most cars depressing the clutch when starting the engine reduces the drain on the battery. How could you prove this? Explain also why gears should not be shifted without first depressing the clutch pedal and keeping it well down until the shift is completed.
10. When should a driver immediately shift his foot from the accelerator and rest it in readiness on the brake pedal? Compile a list of these situations as you describe them. There should be about a dozen at least in town and country combined.
11. Explain why the level of the liquid in the battery should be checked more frequently in summer.
12. The *Road Code* states that it is an offence to exceed 15 m.p.h. *when approaching within 100 yards* of a railway crossing. Explain why 100 yards was selected as the distance and give advice on the procedure that should be adopted at all railway crossings, especially where there are double tracks.

Other topics of general interest

1. Although the closed sedan is more cosy than the open tourer it has its disadvantages.
2. The hours 5 to 7 p.m. on Fridays and Saturdays are the most dangerous for those using the road.
3. The minimum legal driving age is too low. It should be raised to 16 years. What difference would this make?
4. The mathematical definition that a straight line is the shortest distance between two given points explains why people jay walk and cut corners. How can this tendency be corrected?
5. The graduated gauge and the red-light indicator on the dashboard both have their advantages and disadvantages. What are they?
6. Can a driver be charged with driving without due care and attention?
 - (a) When in a stationary car.
 - (b) When not in a car which has been insecurely or dangerously parked.
 - (c) When making a U-turn.
 - (d) When opening a car door.

7. Can you detect whether your stop light is working while driving the car?
8. Should the best tyres be fitted on the front wheels or on those at the rear?
9. How can motorists best visualise the danger zone that exists in front of them at various speeds?
10. Would a speedometer of this type

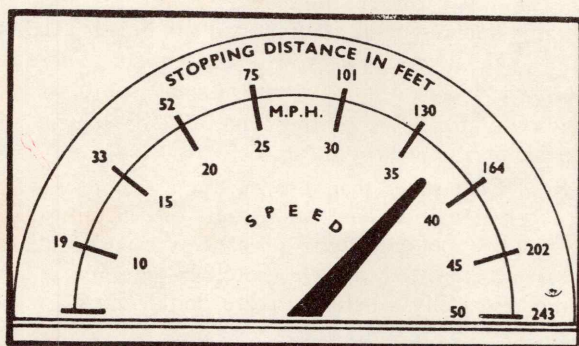


Diagram No. 54

help to stop this?

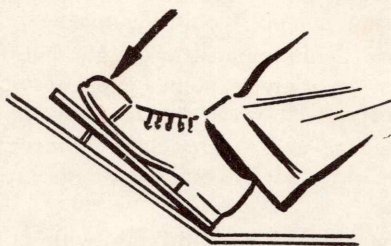


Diagram No. 55

Can you detect whether your ship is working within
 leaving the ship
 2. Should the bearings be taken on the target which is on line
 in the rear
 3. How can indicator best indicate the danger zone that exists
 at front of them at various ranges
 10. Would a speedometer of this type

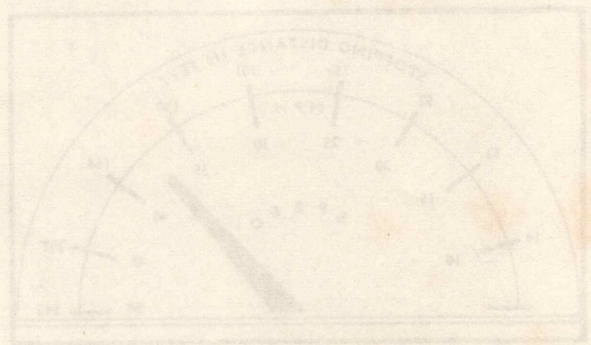


Diagram No. 31

help to stop this?

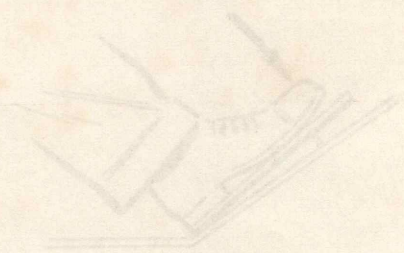


Diagram No. 32



Just remember...
a licence doesn't make you
a competent driver.
This can be accomplished
only by sound driving
techniques and experience

